SCREENING REPORT

Demolition of Above Ground Structures and Removal of Residual Materials - Coke Ovens Site

Sydney, Nova Scotia

Environment Canada
March 2001

PROJECT INFORMATION

Project Name:	Demolition of Above Ground Structures and Removal of Residual Materials - Coke Ovens Site Sydney, Nova Scotia (Coke Ovens Site Clean-up)
Project Location:	Industrial land located in the Muggah Creek watershed, Cape Breton Regional Municipality, Nova Scotia
Purpose of the Project:	• To remove physical hazards posed by derelict structures including buildings, tanks, and stacks; • To reduce the potential for human contact with hazardous materials; • To prevent the spread of hazardous materials away from the Coke Ovens Site; and • To stabilize the site prior to conducting further environment studies and prior to site remediation.
Responsible Authority:	Environment Canada
Environmental Assessment Trigger:	Authorizing payments to the proponent for the purpose of enabling the project
Environmental Assessment Process	Screening of the project and preparation of a screening report
Environmental Assessment Start Date:	July 31, 2000
Project Proponent:	Nova Scotia Department of Transportation & Public Works
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104-02054/

SUMMARY OF THE ASSESSMENT

The Coke Ovens Site is a 60 hectare parcel of industrial land in Sydney, Nova Scotia that contains a variety of derelict structures, waste materials, and tanks containing chemical wastes. The site is located within 800 metres of the Sydney Tar Ponds. The Tar Ponds/Coke Ovens are located within the Muggah Creek watershed and are generally acknowledged to be one of the worst contaminated sites in Canada.

The community-based Joint Action Group (JAG), together with the Government of Canada, the Province of Nova Scotia, and the Cape Breton Regional Municipality, is committed through a Memorandum of Understanding to finding solutions to the environmental and health risks arising from contamination in the Muggah Creek watershed. One of the proposed projects recommended by JAG and under consideration by government parties is the demolition of above ground structures and removal of residual materials on the Coke Ovens Site. The proposed project has the following objectives:

- to remove physical hazards posed by derelict structures including buildings, tanks, and stacks;
- to reduce the potential for human contact with hazardous materials;
- to prevent the spread of hazardous material away from the Coke Oven site; and
- to stabilize the site prior to conducting further environmental studies and prior to any future site remediation.

In considering the provision of funds to this project, Environment Canada was responsible under the *Canadian Environmental Assessment Act* for ensuring that this environmental assessment was completed. Environment Canada prepared this screening level report and is responsible for ensuring that identified requirements are implemented.

The assessment identifies potential environmental effects resulting from the project, effects of the environment on the project, effects of malfunctions or accidents, and cumulative effects that could develop in conjunction with other proposed projects. The primary focus is on potential human health effects resulting from exposure to air-borne contaminants released by project activities. The assessment required modifications to some of the proposed activities and identifies practical and effective mitigation measures to minimize potential effects.

The project requires the development and implementation of an Environmental Management Plan. The plan will specify detailed mitigation, monitoring, and reporting requirements. A draft of the plan has been considered as part of this assessment and acceptance of the plan by Environment Canada prior to the start of project activities will be a requirement of the assessment.

The draft assessment was extensively reviewed and commented upon by government and the public before it was finalized. The draft report was advertised extensively and flyers requesting public input were hand delivered to residents adjacent to the site. Public consultation sessions were held in Sydney from December 11-14, 2000. All comments received during the 41-day public review period were considered in development of the final assessment.

The conclusion of the screening report is that significant adverse environmental effects as a result of this project are not likely, taking into account implementation of the identified mitigation measures. Public concerns do not warrant a referral of the project to a mediator or a review panel.

SOMMAIRE DE L'ÉVALUATION

Le site des fours à coke se trouve sur une parcelle de terrain de 60 ha jadis utilisée à des fins industrielles à Sydney, en Nouvelle-Écosse. On y trouve diverses structures abandonnées, divers déchets industriels et des réservoirs contenant des produits chimiques inutilisées. Cette parcelle de terrain est située dans un rayon de 800 mètres des étangs de goudron de Sydney. Les étangs de goudron/les fours à coke se trouvent à l'intérieur du bassin hydrographique du ruisseau Muggah, et il est généralement reconnu qu'ils comptent parmi les sites les plus contaminés au Canada.

En collaboration avec le gouvernement du Canada, la province de la Nouvelle-Écosse et la municipalité régionale du Cap-Breton, le Groupe d'action conjointe, un organisme de défense des intérêts de la collectivité, est déterminé à trouver, dans le cadre d'un protocole d'entente, des solutions aux problèmes environnementaux et aux risques pour la santé attribuables à la contamination du bassin hydrographique du ruisseau Muggah. Parmi les projets recommandés par le GAC et qui sont actuellement à l'étude par les divers paliers de gouvernement, mentionnons la démolition de structures en surface et l'enlèvement des matériaux résiduels se trouvant sur le site des fours à coke. Le projet proposé vise les objectifs suivants :

- éliminer les dangers physiques que posent les structures abandonnées, notamment des bâtiments, des réservoirs et des cuves;
- réduire les risques d'exposition humaine aux matières dangereuses;
- prévenir la propagation des matières dangereuses en dehors du site des fours à coke;
- stabiliser le site avant d'y entreprendre d'autres études environnementales et des mesures éventuelles d'assainissement.

Avec les crédits fédéraux qui lui sont attribués, Environnement Canada est chargé, en vertu de la *Loi canadienne sur l'évaluation environnementale* (LCEE), de veiller à ce qu'une évaluation environnementale du site du projet soit entreprise. Environnement Canada a préparé le rapport d'examen préalable ci-joint et doit s'assurer que les exigences prescrites sont mises en oeuvre.

L'évaluation a permis de déterminer les incidences environnementales néfastes potentielles du projet, les effets que pourraient avoir des défauts de fonctionnement de dispositifs ou des accidents et les effets cumulatifs susceptibles de se produire si d'autres projets sont entrepris. L'objectif principal de l'évaluation consistait à établir les effets éventuels sur la santé humaine de l'exposition aux contaminants de l'air émis par les activités entreprises dans le cadre du projet. Suite aux résultats de l'évaluation, certaines activités proposées ont été modifiées et certaines mesures pratiques et efficaces d'atténuation devront être prises afin de minimiser les effets éventuels.

Le projet nécessitera l'élaboration et la mise en oeuvre d'un plan de gestion environnemental. Ce plan présentera de façon détaillée les exigences en matière d'atténuation, de surveillance et de présentation de rapports. Une ébauche du plan a été étudiée dans le cadre de cette évaluation, et Environnement Canada devra approuver le plan avant que les activités du projet ne soient entreprises.

À ce stade de l'évaluation environnementale, Environnement Canada a tiré la conclusion préliminaire suivante : il est peu probable que le projet ait des incidences environnementales néfastes ou des effets néfastes sur la santé si les modifications nécessaires sont apportées et si les mesures d'atténuation appropriées sont prises.

Le rapport d'évaluation provisoire a fait l'objet d'un vaste examen et de nombreux commentaires de la part des représentants gouvernementaux et du public avant qu'on en produise la version finale. La présentation au public du rapport provisoire a été annoncée sur une grande échelle, et des circulaires invitant le public à faire part de ses commentaires ont été distribuées en personne aux résidents des secteurs adjacents au site. Des séances de consultation publique ont eu lieu à Sydney du 11 au 14 décembre 2000. Tous les commentaires reçus durant la période d'examen public de 41 jours ont été pris en considération lors de la préparation de l'évaluation finale.

Le rapport d'examen préalable conclut qu'il est peu probable que le projet ait des incidences environnementales néfastes, compte tenu de la mise en oeuvre des mesures d'atténuation indiquées. Les préoccupations soulevées par le public n'était pas suffisantes pour justifier le renvoi du projet à un médiateur ou une commission d'examen.

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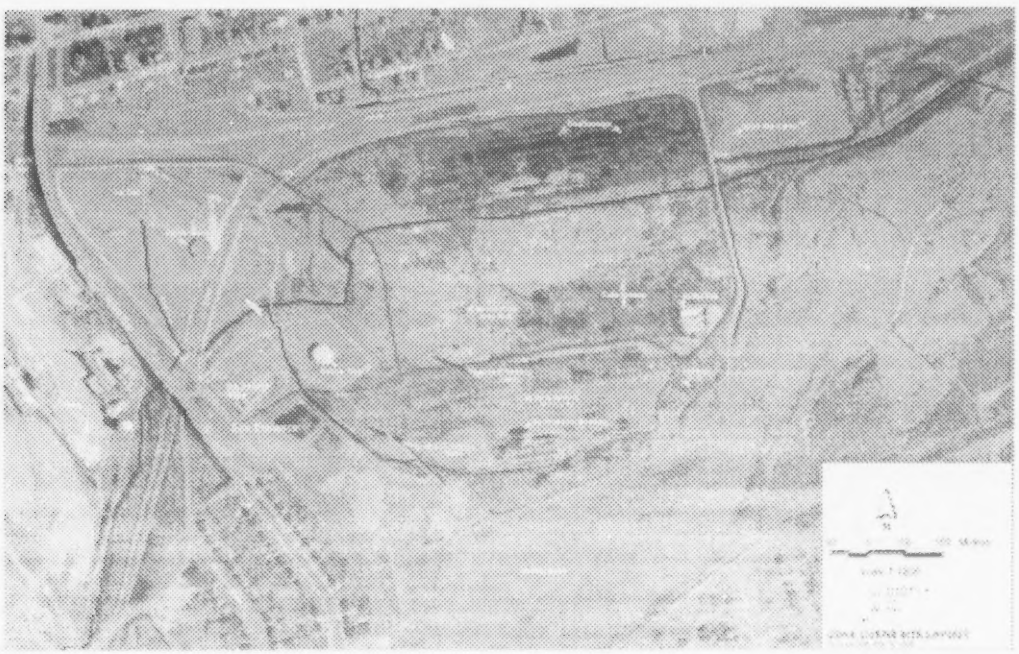
1.0 INTRODUCTION

1.1 Location / Historical Context

The Coke Ovens Site (the site) is a 60 hectare parcel of industrial land containing contaminated soils, groundwater and surface waters, derelict structures, residual materials, and tanks containing chemical wastes. The site is located within the Muggah Creek watershed, which is situated in the centre of Sydney, Nova Scotia (see Figure 1). An aerial view of the Coke Ovens Site is found in Photograph 1. Approximately 800 m west of the site are the Sydney Tar Ponds, which contain approximately 700,000

tonnes of contaminated sediments. The coke ovens were a major source of Tar Ponds contamination. The Tar Ponds / Coke Ovens Site are generally acknowledged to be one of the worst contaminated sites in Canada.



Photograph 1. Aerial View of Coke Ovens Site.

In 1986, Environment Canada and the Province of Nova Scotia signed an agreement to initiate clean-up of the Sydney Tar Ponds. A requirement to shut down the coke ovens and related operations was included in the clean-up agreement. The shutdown was completed in 1988. A facility was constructed to incinerate Tar Ponds sediment, however the sediment removal and transport system failed to operate satisfactorily and, for this and other reasons, the clean-up project was abandoned in 1994.

In 1996, following the failed clean-up attempt, and the rejection by the community of a subsequent proposal to contain the Tar Ponds sediment with slag, the three levels of government met with

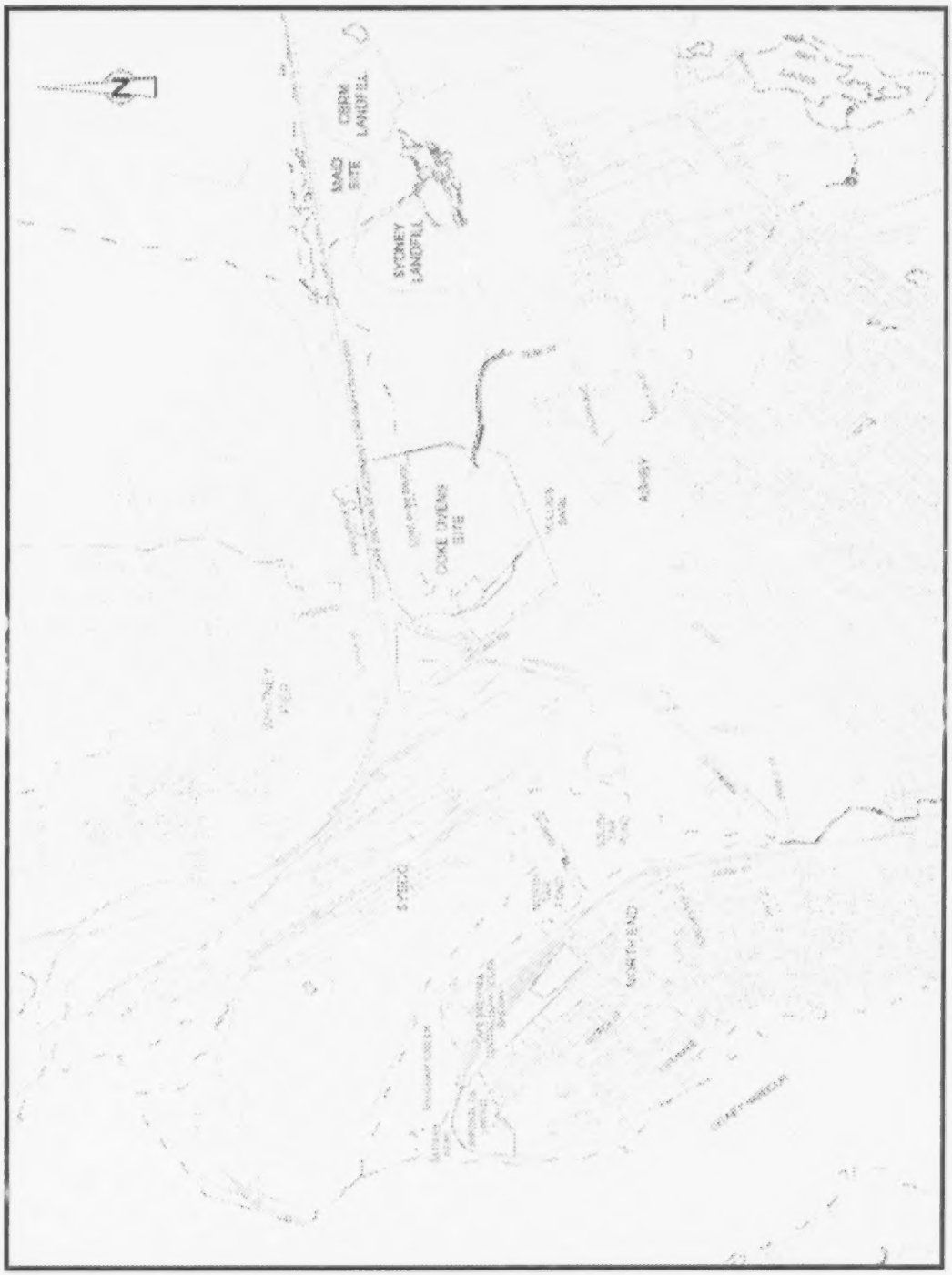


Figure 1. **Site Location**

community representatives to discuss options for future clean-up efforts. Those in attendance agreed to establish an open, transparent, and inclusive process in which government would participate as part of the community. This resulted in the formation of the community-based Joint Action Group for Environmental Clean-up of the Muggah Creek Watershed Association (JAG). JAG, together with the Government of Canada, the Province of Nova Scotia, and the Cape Breton Regional Municipality (CBRM), is committed to finding solutions to the environmental and health risks arising from contamination in the Muggah Creek watershed.

A Memorandum of Understanding guides the participation of JAG and government parties. JAG's responsibilities include providing governments with recommendations relating to the restoration of the Muggah Creek watershed to acceptable conditions. The government parties' responsibilities include funding and the timely implementation of approved projects. These projects address safety and site security issues, site stabilization, and data collection. JAG has recommended a number of projects, including this one, to the government parties.

The federal government is represented in the JAG process by Health Canada and Environment Canada. The provincial government is represented by the Departments of Health, and Transportation & Public Works. CBRM, which includes the former City of Sydney, is the municipal-level government party. Federal funding is administered by Environment Canada.

1.2 Previous Demolition and Removal Projects

In addition to the coke ovens (which began operation around 1900), the site has contained a coal tar refining plant, benzol plant, ammonia sulphate by-products plant, sulphuric acid plant, brick plant, two coal-washing facilities, coke and coal storage areas, and numerous storage tanks for tar, benzol, and other by-products of coke production. Periodic demolition and clean-up efforts (beginning in 1920 and continuing until as recently as 1998) have left the site with storage tanks, derelict structures, demolition debris and large areas of concrete rubble, coke, coal, cinders, brick rubble and steel plant slag.

In February 1998 a contractor was retained to undertake the demolition and removal of surface structures and material stockpiles from the Coke Oven Site. Shortly after work commenced, residents on Frederick Street, a short distance north of the site, noticed a yellowish substance seeping from the railbed embankment adjacent to their properties. Clean-up work was suspended in order to determine if there was any connection between clean-up activities and the railbed seepage and because of public complaints relating to deteriorating air quality from the removal of coal. Surface clean-up activity was eventually abandoned in December 1998 with a commitment made to the community to conduct additional assessment of health risks associated with the clean-up.

A report assessing all information relating to the Coke Ovens Site (CBCL Ltd. / Conestoga Rovers & Associates, 1999) recommended that all remaining structures be removed to provide access to the soils beneath the buildings for further investigation, assessment and clean-up. This recommendation was endorsed by JAG and accepted by the government parties, thus leading to this project.

1.3 Overview of the Current Project

1.3.1 Purpose of the Project

The purpose of the proposed *Demolition of Above Ground Structures and Removal of Residual Material on the Coke Ovens Site Project* (the project) is to:

- remove physical hazards posed by derelict structures including buildings, tanks, and stacks;

- reduce the potential for human contact with hazardous materials;
- prevent the spread of hazardous materials away from the Coke Ovens Site; and
- stabilize the site prior to conducting further environmental studies and prior to site remediation.

Activities will include demolishing all of the remaining above ground structures and removing most demolition debris and residual surface materials from the site. To remove hazardous conditions, some inert non-contaminated demolition debris will be used for filling foundations and below ground chambers. To facilitate demolition activities, a new access road will be constructed (with approval from CBDC) through Mullins Bank and site support infrastructure will be established.

This project is one of a series of planned projects necessary to remediate the Coke Ovens Site. Currently, reconnaissance and detailed testing programs are ongoing, as part of a site assessment of the Muggah Creek watershed. Phase I of the site assessment is complete. Phase II is underway and Phase III is proposed. These studies will characterize soil and groundwater contamination, identify underground infrastructures that could act as migration pathways, and determine groundwater flow direction and rates. This project, in coordination with the Phase II/III studies, will allow for future remediation of the site.

1.3.2 Project Proponent

This project falls under the Memorandum of Understanding for the Environmental Clean-up of the Muggah Creek Watershed. The project proponent is the Nova Scotia Department of Transportation & Public Works (NSTPW). As the work will include the use of skilled labour and specialized equipment not currently employed by the NSTPW, suitably skilled and equipped contractors will be retained by NSTPW in publicly tendered contract packages. NSTPW has retained Conestoga-Rovers & Associates as the Project Management Consultant (PMC) for the project. The PMC will prepare and administer the tender packages as well as oversee work on the site.

1.3.3 Project Description

The project will include the removal and disposal of the following residual materials from the Coke Ovens Site (see Figure 2):

- a stockpile of approximately 473 tonnes of elemental sulphur located within the remains of, and adjacent to, the Sulphur Building;
- the Domtar Tank contents - approximately 1355 m^3 of liquid, 92 m^3 of sludge, and 2247 m^3 of semi-solid material generated during previous decommissioning activities at the site;
- the Benzol Plant Area Tank contents - approximately 2 m^3 of water and 1.75 m^3 of floating sludge;
- the Benzol Tank contents - approximately 21 m^3 of petroleum hydrocarbon sludge;
- a 30 tonne stockpile of contaminated wood Cooling Tower Grid debris;
- a quantity of unprocessed coal from the coal storage area - estimated at 26,000 tonnes;
- a stockpile of coke - estimated at 5,000 tonnes; and
- miscellaneous surface debris including wood, concrete, and scrap steel.

The project will also include the demolition, removal and disposal of the following structures from the site (see Figure 2):

- the Sulphur Building - remnants of a highly deteriorated concrete-walled building located at the eastern extremity of the site;
- the Domtar Tank - an open top 6 m high steel tank, 28 m in diameter, that contains solid, liquid and sludge wastes;

Figure 2. **Locations of Structures and Materials**

- the Benzol Plant Area Tank – a 3 m diameter, 12.6 m long, steel tank lying horizontally on the ground;
- the No. 5 and No. 6 Battery Stacks - two reinforced concrete stacks that are 69 m and 61 m tall, respectively;
- the No. 6 Coke Oven Battery - the remains of concrete, brick, and steel structures reduced to mounds of rubble; and
- the By-Products Building - a partially demolished structure approximately 1520 m^2 in area formerly used for the production of ammonium sulphate from coke oven gases.

A new access road will extend from the north end of Teak Street to the southeast corner of the Coke Oven Site through Mullins Bank. Site support facilities, including a vehicle wash pad, wastewater treatment facilities, personnel wash house, and offices, will be located at the southeast corner of the site.

The project does not include any activities relating to the following structures/materials which are also found on-site: underground structures, the tar cell, and the brick pile. The underground structures will be addressed as part of future site remediation and the tar cell is being considered as a separate project. The brick pile will be considered for removal as part of another JAG supported project – the Municipal Landfill Leachate Management Project. If it is not removed, it will remain on-site and its use or disposal will be reconsidered during planning for later clean-up activities. There are no activities, except construction and use of the new access road, proposed for Mullins Bank, the southern portion of the Coke Ovens Site (see Figure 1). Mullins Bank was used for the storage and transfer of coal and has already been decommissioned, graded, and seeded.

1.3.4 Site Ownership

Most of the Coke Ovens Site is owned by the Province of Nova Scotia. A strip of land owned by the Canadian National Railway runs through the northwest corner. Mullins Bank is owned by the Cape Breton Development Corporation (CBDC). Access through Mullins Bank will require CBDC's approval. The site is bordered to the east by the Municipal Ash Industrial Disposal (MAID) site, CBRM's solid waste disposal facility (the land is partially owned by the province); to the south by the former tramline land owned by the CBDC; to the west by Victoria Road and the steel mill; and to the north by the CBDC railway property. Residential, commercial and public properties in the Victoria Road, Frederick Street, Currys Lane and Vulcan Avenue areas are in close proximity. Lands southeast of the site between Oak and Elm Streets are zoned light industrial. These lands are largely privately owned and relatively undeveloped, except for one existing commercial development. Fences have been installed around the Coke Ovens Site to prevent public access.

1.3.5 Project Schedule

The project is scheduled to commence no sooner than April 2001 and is projected to be completed as early as December 2001. The duration of the individual demolition and removal activities will be, in total, approximately eight months. However, project scheduling and unpredictable weather may result in periods between the individual activities when there is no work going on. Therefore, completion of the last activities may extend beyond December 2001. Winter weather conditions may then require these activities to be carried over into the following year, 2002.

1.4 Sources of Information

A number of studies were completed to provide additional information for the project. These reports provide valuable information for the environmental assessment process. The three key studies that are particularly relevant to this environmental assessment are identified below.

Material Sampling Program

A material sampling program was recommended as one of the initial steps towards an overall environmental site assessment of the Coke Ovens Site (Cape Breton Environmental Group, 1997). The objective of the program was to determine the extent of existing contamination associated with selected materials and structures that remain on-site. A follow-up program was initiated in 1998 to conduct additional material sampling to supplement the information collected during the original program (Jacques Whitford Environmental Ltd., 1998).

Phase I Site Assessment

The Phase I Site Assessment of the Muggah Creek Watershed was commissioned as the first step in the environmental clean-up of industrial lands in the project area. The study (CBCL Ltd. / Conestoga-Rovers & Associates Ltd., 1999) provides a summary and understanding of the environmental conditions within the Muggah Creek watershed. Information compiled will assist in the design and implementation of future investigations by delineating the nature and extent of contamination and by characterizing background conditions prior to remedial activities.

Development of Interim Separation Zones

One of the recommended measures of the Phase I Site Assessment was to develop appropriate interim separation zones associated with the demolition of above ground structures and removal of residual materials at the Coke Ovens Site. The purpose of interim separation zones was to ensure adequate separation between the demolition activities and adjacent land uses. The evaluation of potential off-site human health effects was of critical importance in completing the study.

The study (AGRA Earth & Environmental Ltd., 2000a) was conducted using conservative approaches and assumptions and erred on the side of protecting the health of the residents in the area. The assumptions and findings of this study are discussed in more detail in Section 4 of this report.

Other Studies

In conducting the assessment, it was concluded that existing information on species at risk and archaeological resources was insufficient to allow the project to proceed. The Atlantic Canada Conservation Data Centre was consulted (S. Gerriets, pers. comm., 2000) on the likelihood of encountering rare or endangered species in the project area. An archaeological assessment was conducted for the Coke Ovens Site (Jacques Whitford Environment Ltd., 2000).

1.5 Scope and Responsibility for the Environmental Assessment

The proposed project consists of demolishing above ground structures and removing demolition debris and residual surface materials from the Coke Ovens Site. In addition, activities related to the transport of materials on municipal roadways to CBRM's MAID site, or to the provincial highway system for delivery elsewhere, are included within the scope of the project. Facilities selected for disposal of wastes will operate within the terms of valid permits and applicable regulations. The operations of those sites do not fall within the scope of the project. Temporal boundaries for the project extend from the start to the completion of specified on-site activities.

The environmental assessment addresses the project's potential adverse environmental and human health effects in a manner consistent with the requirements of the *Canadian Environmental Assessment Act* (CEAA). This includes assessing the effects of the environment on the project, the effects arising from malfunctions or accidents, as well as cumulative adverse effects.
Wherever necessary, the scope of these effects has included the site itself, the airshed immediately around the site, and the immediate off-site area. Consideration is given to mitigation measures that are

technically and economically feasible, with a priority on impact avoidance (i.e. pollution prevention). The project will require a follow-up program designed to verify the accuracy of environmental assessment predictions and to asses the effectiveness of any measures taken to mitigate the adverse environmental effects of the project. The program will include weather monitoring and air quality monitoring to provide immediate results and allow for corrective action should project-specific air quality criteria be exceeded. Alternative means of carrying out some aspects of the project, including concurrent scheduling, have been considered and, in some cases, adopted. Public consultation focused on those in the community who could be most directly affected by project activities.

Under the federal/provincial/municipal Cost Share Agreement, Environment Canada has been requested to provide funds for this proposed project. In considering the provision of funds, Environment Canada is a "Responsible Authority" under CEAA and must ensure an environmental assessment is conducted. No other federal government departments with federal environmental assessment obligations have been identified through application of the CEAA's *Regulations Respecting the Coordination by Federal Authorities of Environmental Assessment Procedures and Requirements*.

The proposed project is not subject to requirements of the Environmental Assessment Regulations pursuant to the Nova Scotia *Environment Act*. The project will, however, be subject to numerous regulatory approvals and requirements.

This screening report makes use of a substantial body of existing information and takes into account the results of studies conducted as part of the planning for the project. This includes a discussion document circulated in August 2000 by Environment Canada to interested parties to assist in defining the key issues and regulatory requirements, and a draft screening report circulated for review and comment in December 2000. The screening decision has been made following review of all comments received on the earlier documents.

2.0 PROJECT DESCRIPTION

2.1 Operations Overview

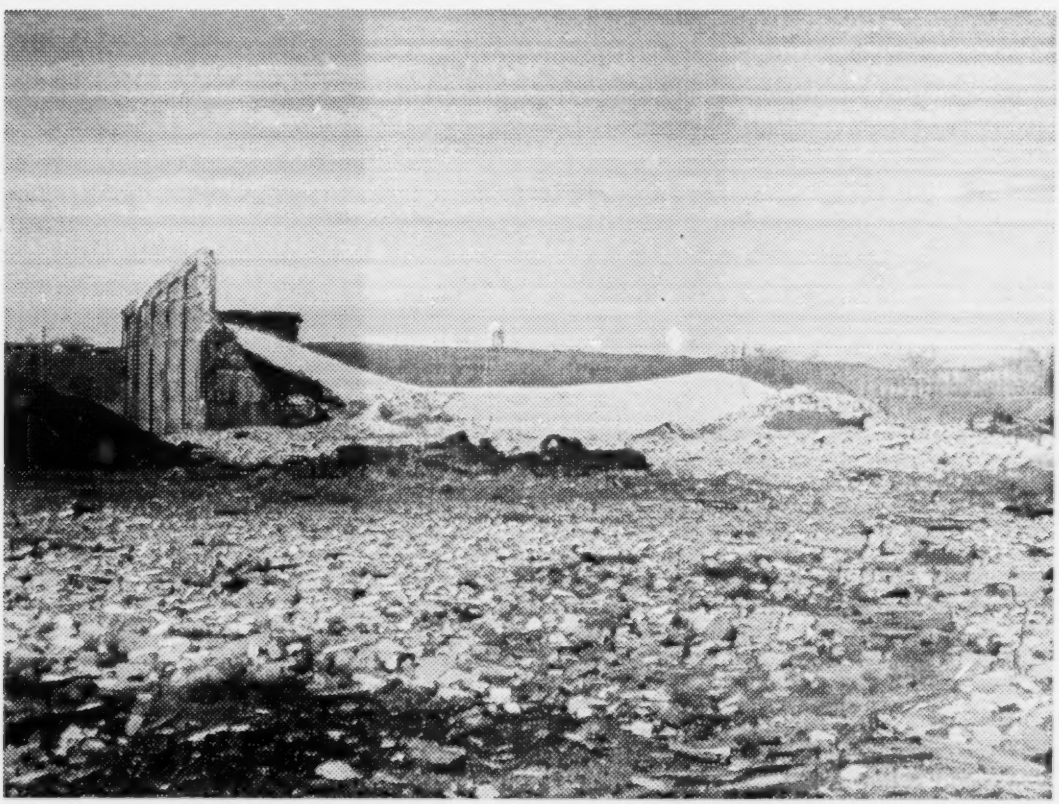
Figure 2 (Section 1.3.3) illustrates the layout of the Coke Ovens Site and the location of the above ground structures and residual materials that are to be demolished and removed.

The procedures described below reflect the current expectations for the project. The project is complex and modifications brought about by receipt of additional information through the tendering process or elsewhere are inevitable. Minor modifications will be addressed though the processes identified for ensuring implementation of mitigation and follow-up measures (Section 6.0). Major changes to procedures that re-define the project may impose additional assessment obligations on Environment Canada.

2.2 Removal of Residual Materials

2.2.1 Sulphur Stockpile

The sulphur building was used as a storage facility for elemental (pure) sulphur (see Photograph 2). The upper portion of the building was previously demolished, however a stockpile of bright yellow sulphur



Photograph 2. Sulphur Building and Contents

Material remains overtop of a concrete floor within the concrete walls and in the adjacent area. There is an estimated 473 tonnes of sulphur within the remains of the building and in the immediately adjacent area. It is a mix of sand, gravel and cobble-sized particles.

The elemental sulphur will be loaded into suitable transport trucks for sale or disposal. Emissions of volatile compounds at levels of concern are not anticipated. The material will be wetted to control particulate emissions. The portion of the stockpile not being actively loaded will be covered with polyethylene sheeting. A real time air monitoring program will be in place while work is ongoing.

The preliminary determination is that the sulphur found on-site will not be classified as a waste dangerous good, therefore transportation off-site will likely not require compliance with federal or provincial transportation of dangerous goods legislation. This will be confirmed by the PMC prior to removal. If the sulphur is determined to be a waste dangerous good, it will be handled and transported in accordance with provincial and federal transportation of dangerous goods legislation. The material may have resale value and may be sold as industrial feedstock. If a purchaser cannot be found, the sulphur will be disposed of at an appropriate solid waste disposal facility. The CBRM's MAID site will not be used for the disposal of the sulphur.

2.2.2 Domtar Tank Contents

The Domtar Tank is constructed of steel, is open at the top, and is 28 m in diameter and 6 m high (see Photograph 3). This tank represents the largest and only remaining tank from the Domtar Plant site. As part of previous clean-up programs, tars, chemicals, and other materials were placed into the tank. Tank contents are covered with rainwater. Overflows on the Victoria Road side of the tank have been noted.

The tank contains approximately 1355 m^3 of liquid, 92 m^3 of sludge, and 2247 m^3 of solid or semi-solid material containing a variety of inorganic and organic substances including petroleum hydrocarbons, PAHs, BTEX, phenols, and heavy metals. The solid phase of material is actually more of a semi-solid material that has the consistency of freshly mixed concrete. Previous sampling and analysis of the solid portion of the Domtar Tank contents, along with recent sampling conducted by the PMC, confirmed that PCBs are not present in the non-aqueous phase portion of the tank contents. PCBs were reported in one sample in the water layer at a concentration of 1.2 mg/L.

The water present in the Domtar Tank will not be classified as a waste dangerous good and is suitable for on-site treatment and discharge. It will be pumped directly to a treatment system to be located adjacent to the tank. Treatment will likely consist of passing the wastewater through two bag filters in series (25 micron followed by 10 micron) followed by contact with activated carbon. Provided treatment objectives are met, the wastewater will be pumped to the municipal sanitary sewer system. Off-site treatment is another possibility. If treatment objectives are not met, it will be transported to an off-site industrial liquid wastewater treatment facility. (See Section 2.4.2 for more details.)

The findings from recent testing suggest that both the sludge and the majority of solids from the tank can be removed by utilizing a vacuum pump to transfer the material directly into waste hauling tankers/trucks. If pumping of the solids proves impractical, the solids will be removed by mechanical means and transferred to tankers/trucks. The transfer will be conducted in an air-tight enclosure that will be provided with a ventilation system to capture released organic vapours. The ventilation system will be sized to provide and treat, through activated carbon, a minimum of two to four air changes per hour within the enclosure.

Photograph 3. Domtar Tank

Based on current information it hasbeen concluded that the sludge and solids in the Domtar Tank are waste dangerous goods and will be transported and disposed of at a licenced hazardous waste treatment facility. These facilities are located outside of Nova Scotia. As a prerequisite for acceptance of the waste material, the licenced hazardous waste disposal or treatment facility may require that the sludge and solids be solidified. This solidification operation may occur at the site within the enclosure that will be erected to contain and capture organic vapours. The enclosure will be a temporary structure that will be suitably anchored, will be air-tight, will be operated under negative pressure, and will be cleaned and removed from the site after the Domtar Tank has been cleaned. The selected contractor will finalize the handling and disposal of the tank contents, along with the details of the enclosure.

Once emptied, the tank will be cleaned with a power spray supplemented with an appropriate detergent or degreaser. The wash water will be removed and transferred to a temporary holding tank for sampling and analysis. Depending upon the analytical results, the wash water will be either treated on-site with the system described above, or transferred to a liquid wastewater disposal facility.

Given the close proximity of the existing railway line to the tank, an effort will be made to utilize rail transport as the method of hauling the waste materials to the disposal facilities. Unfortunately, at this time, direct transport to a disposal facility does not appear viable. The waste may need to be transferred into trucks at a transfer facility for final delivery to the disposal facility. The transport and handling methods will be finalized by the selected contractor.

2.2.3 Benzol Plant Area Tank Contents

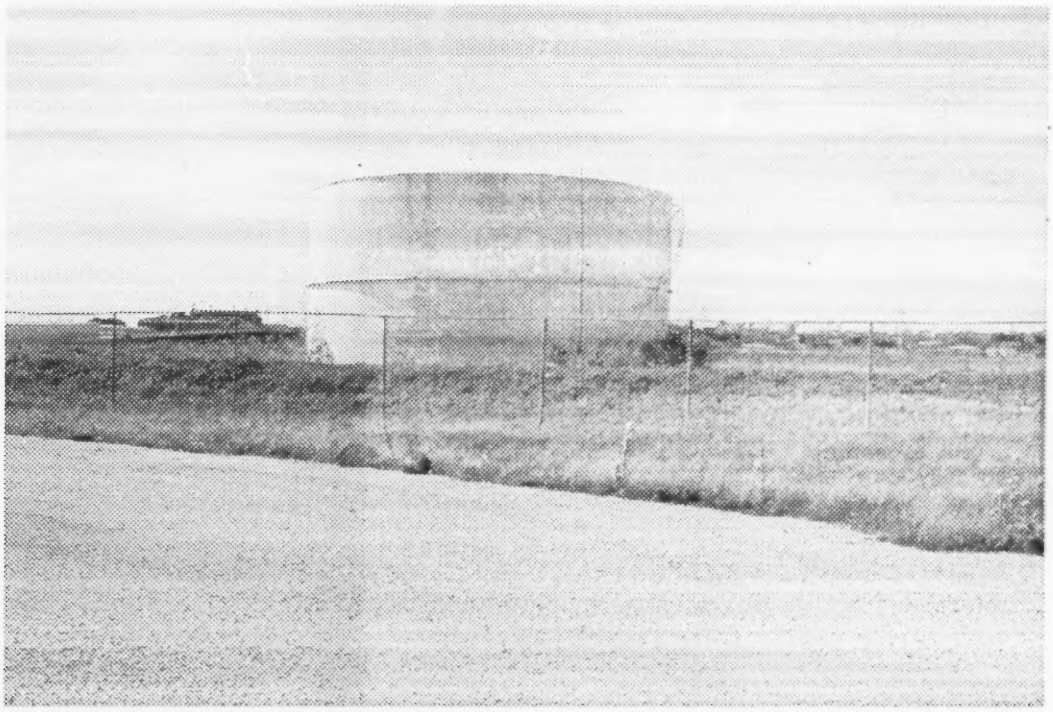
The Benzol Plant Area Tank is a 3 m diameter, 12.6 m long steel tank lying horizontally on the site of the former Benzol plant. Contents are estimated to be 2 m^3 of water with 1.75 m^3 of floating sludge. Heavy metals, petroleum hydrocarbons, toluene, xylenes and phenols have been detected in the oil and water samples. The top port is open to the atmosphere, allowing accumulation of precipitation in the tank and escape of volatile substances.

The sludge will be pumped into licenced waste hauling tankers for transport and disposal at a licenced hazardous waste treatment facility. Prior to removing the liquids, the tank contents will be tested by the PMC to verify previous findings and to finalize disposal options.

Once emptied, the tank will be cleaned with a power spray and the contents removed. Wash water will be treated in the same manner as Domtar Tank wash water.

2.2.4 Benzol Tank Contents

The Benzol Tank, 23 m in diameter and 16 m high, is located near the west side of the site within a fenced area (see Photograph 4). The tank contains approximately 21 m^3 of high moisture sludge contaminated with petroleum hydrocarbons, PAHs, and volatile organic compounds. Current information would require the sludge will be classified as a waste dangerous good under the federal *Transportation of Dangerous Goods Act.*



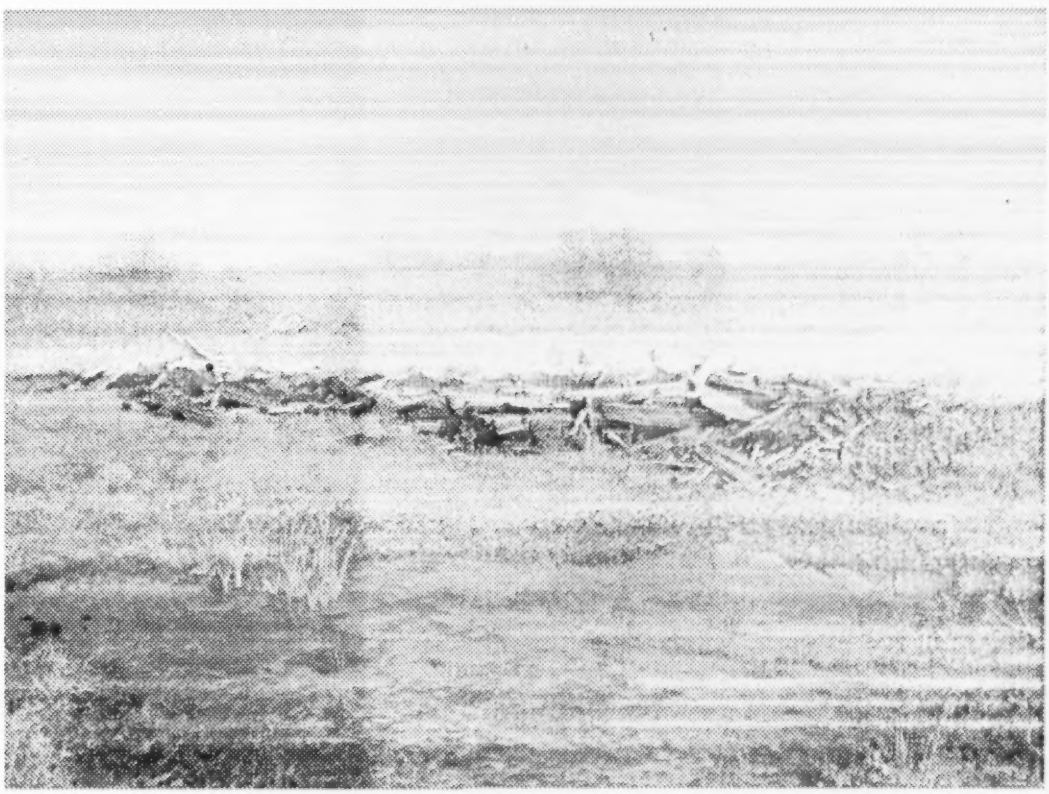
Photograph 4. Benzol Tank

Built in 1983, the tank appears to be in good structural condition and it may have uses during site clean-up. After cleaning the tank, a thorough inspection will be done of the inner wall surfaces for deterioration and of the bottom of the tank for deterioration and metal thickness loss. A pressure certification will be required prior to utilizing the tank for storage purposes. If serious defects are found, the tank will be dismantled and disposed of as scrap metal. If the tank is found to be sound, it will be maintained for possible future use during site remediation.

The sludge will be removed by vacuum truck and transported to a facility outside of Nova Scotia licenced to handle waste dangerous goods. The tank will then be cleaned with a high-pressure wash. The wash water will be treated in the same manner as Domtar Tank wash water.

2.2.5 Cooling Tower Grid Debris

The Cooling Tower Grids are wooden baffles that were used to absorb light oil components from the coke oven gas stream. The grids are currently staged near the perimeter fence at the southeast corner of the fenced area of the Coke Ovens Site (see Photograph 5). Given the deteriorated condition of the wood and ad hoc nature of the storage piles, the volume of the grids can only be roughly estimated--30 tonnes. The grids are contaminated with BTEX, petroleum hydrocarbons and phenols.



Photograph 5. Cooling Grid Remains

The cooling grids will be loaded into transport trucks by either a loader or an excavator and, relying on current information, it is expected that disposed of at a hazardous waste disposal facility. Transportation of dangerous goods legislation will apply. In addition to the actual grids, the upper layer of soil directly in contact with the grids will also be excavated and loaded into the transport trucks for disposal at a hazardous waste disposal facility. As a temporary measure prior to the eventual remediation of the site, a soil cover with seeding and mulching will be applied to minimize contaminated run-off and to provide an additional barrier to the sub-surface soils.

2.2.6 Unprocessed Coal Piles

The unprocessed coal piles are located along the northern boundary of the site, bound to the south by Coke Ovens Brook; to the east by Coke Ovens Site fencing; to the west by the site of the former brick plant; and to the north by the CBDC railway right-of-way. The coal pile consists of several stockpiles and a thin surface layer, covering an area of approximately 3.5 hectares. The volume of coal is estimated to be 26,000 tonnes. Removal may expose underground chambers. To minimize safety hazards posed by these water filled chambers, inert, non-contaminated material such as concrete or brick may be used to fill these voids. The chambers will be filled if deemed appropriate. Filling the chambers as part of this project does not preclude future investigation and remediation as part of the overall site clean-up.

Coal will be loaded into transport trucks utilizing either a front-end loader or an excavator and will be transported from the site to an appropriate facility for disposal or for use as a supplemental feedstock. Rail transport is a possibility. The removal of the stockpiles will proceed in a controlled fashion with a buffer of coal left above underlying soils. The buffer is required as the mixing of soil with the coal may limit disposal options. Additionally, a buffer will prevent disturbance of potentially contaminated soil. Coal will not be excavated from below the water table.

As a temporary measure prior to the eventual remediation of the site, a soil cover with seeding and mulching will be applied to minimize contaminated run-off and prevent unauthorized removal of remaining coal. This soil cover will provide an additional barrier to the sub-surface soils. The estimated volume of soil cover for both the coal area and the coke area (described in Section 2.2.7 below) is approximately 9,500 m^3. This interim measure does not preclude future investigation of the coal area, nor will it affect the final clean-up of the site.

2.2.7 Coke Storage Area

The coke storage area is located in the central portion of the site and is bound to the south by the Coke Batteries, to the north by the coal pile runway and Coke Ovens Brook, and to the east and west by access roads. The coke produced by the plant was temporarily stored on an open pad, commencing some time after 1966. The products included blast furnace coke, pea-sized coke, and breeze. Most of the stored material was removed during initial demolition in the late 1980s. Today, the coke storage area consists of two above-grade stockpiles and a thin surface layer. It covers an area of approximately 3.3 hectares. The volume of the coke is estimated to be 5,000 tonnes. It will be removed, transported, and disposed of in manners similar to the those required for the coal.

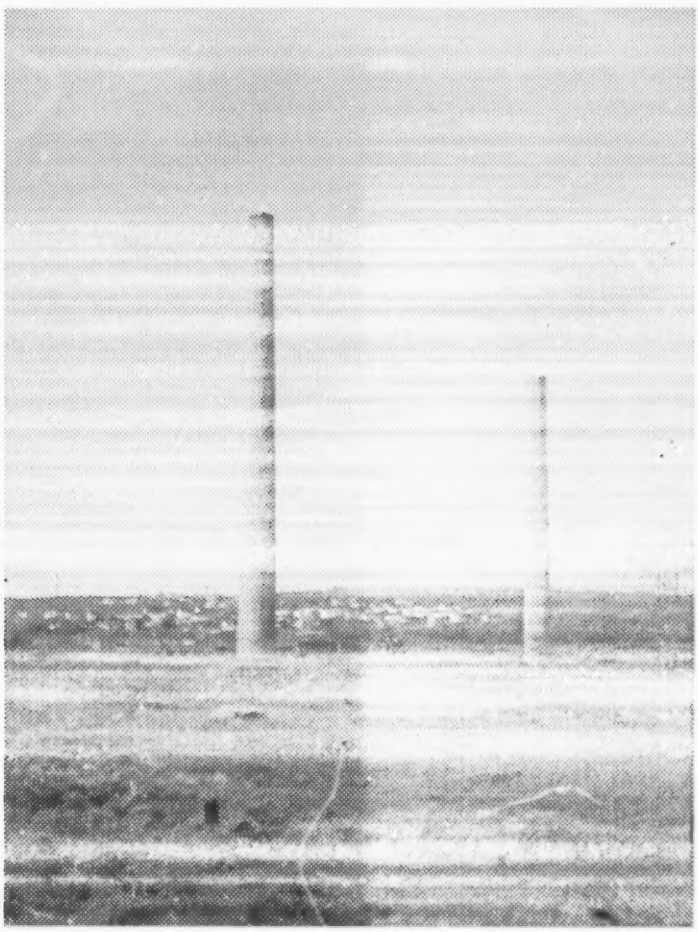
2.2.8 Miscellaneous Surface Debris

Debris from previous demolition activities, including scrap wood, railway ties, demolition debris, and scrap metal, is present at surface grade. The volume of surface debris that will be removed and disposed of is roughly estimated to be 2,000 cubic meters. To facilitate site clean-up, and to minimize health and safety concerns, the debris will be removed and staged with similar materials pending waste characterization for off-site disposal or recycling.

2.3 Demolition and Removal of Above-Ground Structures

2.3.1 No. 5 and No. 6 Battery Stacks

These stacks each comprise a tapered cylindrical reinforced concrete shell separated by an annular air space from an internal brick lining. Stack No. 5 is 69 m tall and Stack No. 6 is 61 m tall (see Photograph 6). Both have a base diameter of about 5.8 m with a shell thickness of 254 mm. Both stacks have a thin exterior coating that contains non-friable asbestos, and have approximately 2 m of water-filled chambers at their base.



Photograph 6. No. 5 and No. 6 Battery Stacks

The limited quantities (approximately 50 m^3) of ash and residue at the base of the stack has been tested and found to be contaminated with phenols and PAHs (Cape Breton Environmental Group, 1997). To minimize the release of contaminated dust from the stack during demolition, controlled removal of this material, by hand tools or vacuum truck, will be the initial activity. The ash and residue will be considered waste dangerous goods and transported to a secure industrial solid waste disposal facility licenced to accept hazardous waste.

By removing the ash and residue first, the remainder of the stack, excepting the asbestos-containing coating, can be handled as non-hazardous waste. The interior base of the stacks will be filled with a flowable concrete fill to prevent accumulation of standing water and debris from demolition.

Chimney demolition will be in two stages, each of which will, to a certain extent, be a matter of contractor's discretion as far as procedures and details are concerned. As the interior and exterior of the stacks have different characteristics, demolition of the interior lining of the stack will precede demolition of the remainder of the stack. A survey by the PMC to confirm that asbestos is not present in the interior lining will be carried out prior to cleaning. The survey will involve accessing the interior of the stacks to obtain samples of the brick mortar, the gaskets located at the base of each stack, and any other materials that potentially could contain asbestos.

Access to remove the interior brick will be gained from a swing stage suspended by suitable means from the top of the stack. The lining bricks will be manually demolished with hand or pneumatic tools. Rubble will drop to the ground within the stacks where it will be removed and staged for disposal. The concrete shell will act as a chute for these bricks, helping to contain dust. Brick rubble will be transported and disposed of as non-hazardous construction debris.

After the interior lining has been demolished and removed, the concrete shell of the stacks will be dismantled. Access to the stacks will be either through a self-supported ring scaffolding or conventional scaffold from the ground. The chimney will be cut into sections with dimensions suited to the cranes and trucks. Cutting will likely be done by diamond wire saw, although a diamond disc is an option. In either case, water lubrication of the cutting operation will minimize dust generation. Shielding will prevent any dispersion of the water. These sections will then be lowered to the ground by a crane. The selected demolition contractor will finalize the details of the actual work method implemented.
The stacks have asbestos in a thin exterior plaster-like coating and in mortar used for exterior repairs (patching). The asbestos is classified as non-friable; that is to say the material, when dry, cannot be crumbled, pulverized or reduced to a powder by hand pressure. As a consequence, working with the material is not subject to special regulations. Nevertheless precautions will be taken to prevent any release of the material to the environment. A contractor of demonstrated competence in handling asbestos will perform all work in accordance with the *Occupational Health and Safety Act*. Constant water misting of cutting operations will reduce the need for personal protective equipment. It may, in some circumstances, be used as a precaution and Tyvek coveralls may be used for cleanliness. All work plans and work will be subject to review by the Nova Scotia Department of Environment & Labour.

Transportation of non-friable asbestos materials is not required to adhere to the Asbestos Waste Management Regulations under the provincial *Environment Act*. Precautions will nevertheless be taken to ensure that there is no release of the material to the environment during transportation (see Section 2.5). Disposal will be at the MAID site. Activities will be coordinated with landfill management to ensure that the non-friable asbestos materials are buried with a minimum final cover of not less than 125 cm.

2.3.2 No. 6 Coke Oven Battery

This low profile mound of rubble contains the jumbled remains of a concrete, brick and steel structure overlying a water-filled basement. The structure will be demolished to grade level using a hydraulic hoe-ram or similar equipment. The concrete rubble generated during demolition will be used to fill the basement and lower levels of the structure in order to remove the physical safety hazard of open cavities filled with water. Surplus material, if any, will be transferred to the MAID site.

The water in the subsurface structure is contaminated with PAHs, phenols and metals. It will be removed, only to the extent practical and necessary, to assist with the placement of rubble. Treatment will be as described for the tank wash waters. Infilling with rubble will not preclude future investigation nor hamper final site clean up.

2.3.3 By-Products Building

The By-Products Building is a partly demolished steel frame structure, with an original floor area of approximately 1500 square meters (see Photograph 7). The remaining portion of the building is in an advanced state of deterioration. The presence of lead, metals, PAHs, and phenolics found in site materials present a hazard to human health (Cape Breton Environmental Group, 1997).

Photograph 7. Remains of the By-Products Building.

Asbestos has been found in the By-Products Building, and as litter throughout the southern portion of the site. The eastern end and part of the south side of the building have asbestos-cement siding (transite). Due to their instability, portions of the brick wall and siding will require removal prior to decommissioning work inside the structure. Some of this siding was previously removed and lies in piles near the building. Portions of the siding, or similar siding from previously demolished buildings, comprise the litter. All asbestos has been found to be non-friable. It appears that most piping and vessels in the building have been previously decommissioned (Jacques Whitford Environmental Ltd., 1998).

Workers will remove the siding under wet conditions. The fastenings will be removed and the siding lowered to the ground. Cutting or breaking operations will use water lubrication and misting to preclude dust generation. The material will be handled and disposed of in the same manner as the asbestos waste from the stacks.

Once the siding has been removed, the remainder of the structure will be cleaned prior to being demolished. Cleaning operations will target the removal of accumulated dusts using a combination of power washing and vacuuming. Wash water will be handled in a manner similar to the wash water generated during tank cleaning operations. The solids that are removed will be characterized and disposed of from the site in a manner consistent with their characterization. It is anticipated that the structure will be dismantled and demolished utilizing mechanical shears, thereby reducing the need for workers to enter the structure. Size reduction and segregation of scrap steel from other building products (wood, brick, etc.) will be accomplished with mechanical equipment. Flame cutting of steel will be minimized.

An inspection of the below ground area of this building will be undertaken when conditions allow. An evaluation of materials found will be made, as will decisions regarding their removal and disposal. Infilling of water filled chambers, as described for No. 6 Coke Oven Battery above, will be performed if deemed appropriate.

In addition to the By-Products Building, there are remnants of several smaller structures nearby. These smaller structures will be dismantled and demolished and waste disposed of as per the requirements for the main structure.

2.3.4 Sulphur Building

The Sulphur Building measures approximately 12.5 by 36 m with 40 cm reinforced concrete walls (see Photograph 2). Following removal of the sulphur stockpile, the remains of the structure will be demolished to grade level using a hydraulic hoe-ram or similar equipment. The debris will be removed and staged with similar materials pending characterization for disposal. Once the structure has been demolished and cleared away, a further assessment of potential underground structures will be made. A decision to remove and dispose of water and other wastes present in underground chambers will be made at that time. Infilling, if appropriate, will be performed as per the No. 6 Coke Oven Battery.

There are no plans to excavate the concrete floor believed to exist under the sulphur. If during removal of the sulphur, there is found to be no floor slab, a thin layer of the sulphur will be left in place so the underlying soils are not disturbed. Furthermore, consistent with the approach for the coal and coke stockpiles, a 150 mm protective barrier layer of soil will be placed over top of the sulphur layer as soon as possible, and seeded. The soil layer will be installed prior to the demolition of the remainder of the the concrete structure, to the extent possible.

2.3.5 Domtar Tank

The Domtar Tank is constructed of steel, is open at the top, and is 28 m in diameter and 6 m high (see Photograph 3). The tank has little value for re-use off-site and will be dismantled after the contents have been removed and the tank has been cleaned. The steel will be cut up, loaded and transported to a steel recycling facility.

2.3.6 Benzol Plant Area Tank

The Benzol Plant Area Tank is a 3 m diameter, 12.6 m long steel tank lying horizontally on the site of the former Benzol plant. The tank has little value for re-use off-site. Once cleaned, the steel tank will be dismantled, loaded, and transported to a steel recycling facility.

2.4 Site Support and General Operations

2.4.1 Access Road

A new roadway to gain access to the site will be constructed at the southeast corner of the property (see Figure 2, Section 1.3.3). The majority of the new roadway will utilize previously abandoned routes. The intersection at Welton Street, a major thoroughfare in the area, currently has traffic lights. A branch of the new access road will follow the former access road to the MAID site thereby reducing the volume of MAID site-bound truck traffic on city streets. A vehicle parking area for site workers will be established along the new access roadway.

A portion of the road will cross Mullins Bank, property owned by the CBDC. In order for this section of the road to be constructed, approval from CBDC will be required. Environment Canada discussed this issue with CBDC in February 2000 and approval seems likely and imminent. If acquiring approval for use of the land is delayed, project activities will commence with vehicles relying on the existing site access from Victoria Road. Irrespective of the utilization of the new access roadway, the Victoria Road access will be maintained throughout the life of the project for emergency access and security purposes.

Existing roadways located on the site will be improved as required. These improvements may include the establishment of localized drainage paths and the addition of additional aggregate material to the top of the road. Asphalt paving of selected sections of roadways may be provided for dust control.

2.4.2 Site Support Infrastructure

Site support infrastructure will include wastewater treatment facilities, a personnel wash house, a breakroom for workers, field offices, a weather station, and a vehicle wash pad. These will be located along the new access road near the centre of the site. (see Figure 2, Section 1.3.3).

Sanitary wastewater will include both sanitary wastes and wash water from the worker wash house showers. This wastewater will be piped to the existing municipal sanitary sewer system through a new buried sanitary forcemain.

Other wastes leaving the site will be transported by truck with the trucks being washed at the vehicle wash pad prior to exiting the site. The pad will be constructed of concrete with wash water flowing directly to an integral sump, complete with baffles for oil/water separation and sediment separation. The wash water will then be pumped to a covered holding tank followed by additional treatment by bag filters, followed by contact with activated carbon. The effluent will be pumped to the municipal sanitary sewer system. Water quality of the effluent will be periodically monitored (see Section 5.3). The carbon canisters will be replaced whenever effluent water quality is degraded.
Wastewater generated by cleaning of equipment that has had direct contact with site contaminants will be containerized and characterized. Equipment will be cleaned at the location where it was being used, in a

temporary cleaning station. The equipment will be power washed on a bermed and lined cleaning pad with integral sump. The wash water accumulated in the sump will be transferred into a suitable container using either a vacuum truck or a sump pump. Wastewaters will be characterized and, if appropriate, transferred to the vehicle wash water holding tank for treatment and disposal. If the wastewater is not amenable to on-site treatment, it will be directly transferred into a permitted wastewater hauling vehicle that will transport the wastewater to a licenced and permitted industrial wastewater treatment facility.

A schematic illustrating management of wastewaters is provided in Figure 3. Design details are not finalized and there may be some modifications required. End-of-pipe discharge criteria will apply to all wastewaters. Those criteria will meet or exceed the chemical limits established for inorganic compounds in CBRM's *Sewer Discharge Bylaw*, limits for organics provided in the provincial operating permit for the water treatment plant associated with the former Tar Ponds incinerator, and other appropriate criteria. Wastewater discharges will be in accordance with Nova Scotia Department of the Environment & Labour (NSDOE&L) requirements. Final details will be provided in the Environmental Management Plan.

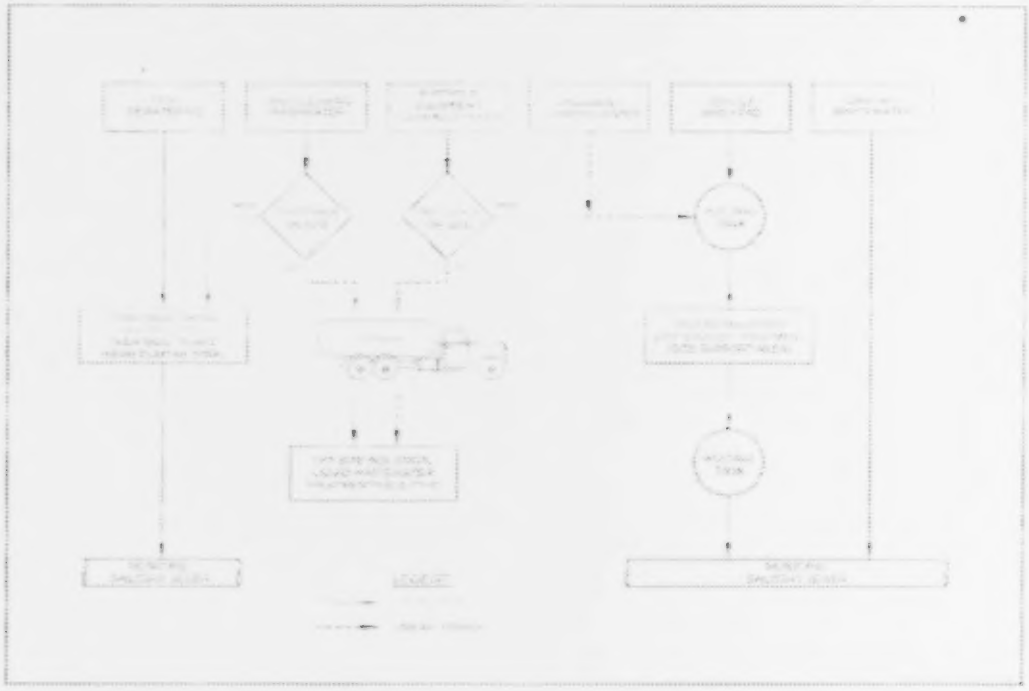


Figure 3. Wastewater Treatment and Disposal

2.4.3 Other Site Support

New perimeter security fencing will be installed around the site support area. This new fencing will include a lockable gate at the new access road. Services such as electricity, water and telephone are available along Vulcan Avenue and will be extended to the site support area.

Measures to control erosion and sedimentation during the course of the project will be implemented at the start of site activities and maintained until all activities are complete. The objective will be to minimize surface soil erosion and sedimentation of waterways.

Erosion control measures will include the installation and maintenance of silt fences along all down-gradient sides of soil excavations and around adjacent disturbed areas. Monitoring of erosion control measures will be conducted on-site at least monthly, and after heavy rains (rainfall greater than 25 mm in 24 hours). Coke Ovens Brook and Cagney Brook will be visually compared upstream and downstream of the site to identify if site activities are causing additional degradation during rain events.

2.5 Off-Site Waste Disposal

Before waste materials can be removed from the site, the nature and the chemical composition of the wastes must be known. This information determines where that material can be disposed of, and how it must be transported to that disposal location. Federal and provincial laws, regulations and guidelines must be consulted in making these decisions. Much of the required information is available in the reports prepared for the 1997 and 1998 Coke Ovens Site Material Sampling Program (Cape Breton Environmental Group, 1997; Jacques Whitford Environment Ltd., 1998), the Development of Interim Separation Zone Report (AGRA Earth & Environmental Ltd., 2000a), and by sampling recently conducted by the PMC. Further chemical characterization of wastes will be undertaken as part of the project activities as deemed necessary and/or as outlined in this document.

In Nova Scotia, the "Guidelines for Disposal of Contaminated Solids in Landfills" (1994) determine which materials are acceptable for disposal in landfills within the province. Materials sent to landfill must meet the criteria detailed in the guidelines. Materials that do not meet these criteria are considered "hazardous waste" and can only be disposed of in a designated hazardous waste secure landfill. Currently there is no such facility in Nova Scotia and out of province disposal is required for hazardous wastes.

The federal *Transportation of Dangerous Goods Act* and regulations govern the handling and transportation of dangerous goods-- products or substances that fall within any of nine classes of substances described in the Act. Waste dangerous goods are dangerous goods that are no longer in use for their original purpose, or are intended for disposal or recycling. All provinces, including Nova Scotia, have their own similar legislation.

To ensure appropriate disposal, all materials leaving the site must be classified according to the federal and provincial regulations and guidelines. The categories of wastes expected are:

- hazardous solids (provincial designation) or waste dangerous goods (federal designation) that must be transported to waste disposal facilities outside of Nova Scotia;
- non-hazardous solid wastes that can be sent to CBRM's MAID site (including construction and demolition debris);
- waste dangerous goods that may be usable for their original purposes ;
- recyclable materials (scrap steel);

PCB wastes, as defined in the Federal Export and Import of Hazardous Wastes Regulations under the *Canadian Environmental Protection Act* and the PCB Management Regulations under the Nova Scotia *Environment Act*, are not expected at this site.

The PMC will be responsible for initial waste classification. An initial screening of the entire list of waste materials planned for off-site disposal will be prepared, focussing on dangerous goods disposal. The selection of disposal facilities will be largely based on competitive bid. Only facilities that are licenced and permitted to accept the type of waste proposed to be sent to the facility will be accepted in the bids. Prior to accepting any facility for disposal of waste, it will be confirmed that the facility is indeed licenced and permitted to accept the waste material. The proponent will notify Environment Canada of the selected disposal facility(s) prior to intiating removal of any waste material at the site.

A resident engineer employed by the PMC will inspect each waste transport vehicle prior to the vehicle leaving the site. An inspection program will be developed by the PMC to ensure that all traffic leaving the site is properly documented and all requirements met. The selected contractors will have the final responsibility for ensuring that all waste materials are handled and transported in accordance with all applicable regulations and assessment requirements.

2.6 Health and Safety Considerations

2.6.1 Risk Management

A draft Risk Management Plan has been prepared by the PMC (Conestoga Rovers and Associates, 2000c) for the environmental clean-up of the Muggah Creek watershed. This plan establishes a program, utilizing risk management techniques, to systematically identify, analyze and respond to risks that have potential impacts on the scope, timelines and costs. The risks associated with undertaking the demolition and removal project will be included in this overall risk management program. The plan, however, focuses on the broader scope of issues that have an impact on the environmental clean-up of the Muggah Creek watershed, such as communication and information, technical quality, scheduling, cost, public support, health and safety, and legal/regulatory issues.

The plan places all identified risks in the overall project perspective and permits ranking in this context. Risk identification, analysis and prioritization is an ongoing process. Risk mitigation plans will be prepared for the highest priority risk items to identify strategies to avoid, reduce and/or manage risk.

2.6.2 Health and Safety Planning

A plan to ensure the health and safety of workers and visitors to the site has been prepared by the PMC. The Master Health and Safety Plan (MHASP) (Conestoga, Rovers & Associates, 2000d) for the environmental clean-up of the Muggah Creek watershed provides guidelines, requirements and procedures intended to protect the health and safety of the public and any person who enters a worksite.

The MHASP was developed using a reasonable and practical approach to implementing standard hygiene and safety practices that protect a worker or visitor and the public from identified hazards. It establishes minimum requirements. Specific activities may warrant more stringent health and safety requirements due to potential exposure to specific hazards and varying site conditions. As such, Project-Specific Health and Safety Plans are required to be prepared by each contractor undertaking an activity on-site that recognizes the MHASP as a minimum standard. This requirement will apply to all contracts issued for this project.

The MHASP is designed to ensure:

- that personnel working on-site are not exposed to physical and chemical hazards which could adversely affect their health and safety;

- that the health and safety of the general public and the environment is not compromised by off-site migration of contaminated materials; and
- compliance is achieved with the Nova Scotia *Occupational Health and Safety Act*; Nova Scotia Department of Transportation & Public Works Occupational Health and Safety Policy; Labour Canada policies; and other applicable regulations and guidelines.

It will be the responsibility of all employers with employees or visitors entering the site to ensure that:

- the requirements of the MHASP are implemented such that activities are completed in accordance with applicable legislation and standards;
- where legislation does not exist because of the unusual nature of certain activities, stringent requirements as presented in the MHASP, or as deemed necessary by the PMC, shall prevail;
- all activities are performed using standard operating procedures, protocols or work practices which are in compliance with provincial and federal legislation; and
- all reasonable and practical precautions, including implementation of appropriate work practices and engineering controls, have been taken to ensure that the health and safety of any person or the public is not impaired by completion of an activity.

Site Health and Safety

On-site health and safety for both workers and visitors will be managed through:

- access control to the property;
- project-specific health and safety planning;
- training of all personnel working on the site;
- medical certification for all personnel who will come in contact with potentially contaminated materials or use respiratory protection;
- regular health and safety meetings on-site so that workers are informed of hazard assessment results, any analytical results associated with the activities, administrative and engineering control requirements, and hygiene practices to be implemented for safe completion of the activities; and
- application of general safety rules, as well as rules for project-specific hazards, work practices, and conditions.

Hazard Assessment and Management

A hazard assessment will be completed for all activities being performed at any property associated with the overall environmental clean-up of the Muggah Creek watershed. The hazard assessment will be included in the Project-Specific Health and Safety Plans and it will be used to confirm appropriateness of existing or proposed administrative and engineering controls, and hygiene practices. The results of the hazard assessment will be communicated to employees during the daily health and safety meeting. Should an assessment identify a hazard that poses immediate risk to workers or the public, this information shall be communicated to the PMC immediately, who will ensure that appropriate hazard mitigation steps are implemented.

Potential physical hazards that may be encountered during site activities, as well as potential chemical hazards on-site are listed in the MHASP. The hazards associated with these materials must be evaluated and incorporated into the Project-Specific Health and Safety Plans, through recommended work practices, levels of protection, and air sampling programs.

Site Control and Contaminant Management

All reasonable and practical removal, handling, transportation, storage and disposal procedures will be used on-site to:

- minimize raising dust;
- minimize the mobilization of substances contained within equipment and materials;
- minimize the release of materials (liquid, solid or gas) into the environment;
- minimize the migration of subsurface contaminants as a result of an activity having a physical (e.g. vibration) or chemical (e.g. increase rain water infiltration) influence on subsurface materials;
- contain all hazardous materials spilled on the ground surface for proper treatment or disposal; and
- minimize exposures of personnel to hazardous materials.

A site control procedure will be developed for all activities involving hazardous materials. Exclusion, Contaminant Reduction and Support Zones will be established as outlined in the National Institute for Occupational Safety and Health guidelines. This will include:

- delineation and visual identification of exclusion zones at the site;
- decontamination of equipment and vehicles used in an exclusion zone prior to being removed from the exclusion zone;
- appropriate personal protective equipment will be worn by all personnel entering an exclusion zone;
- air monitoring to protect the workers and the public in the immediate vicinity of the work zone, to ensure that air quality requirements at zone boundaries are met, and that personal protective equipment and engineering controls are appropriate for the current activities;
- adequate first aid facilities;
- periodic review of activities to ensure that work activities are being completed in compliance with the MHASP and Project-specific Health and Safety Plan.

2.6.3 Emergency Response

In the event of an on-site emergency, the MHASP may be modified or temporarily suspended to permit proper rescue or handling of the emergency situation. The Emergency Response and Preparedness Plan (ERAPP) (Conestoga Rovers & Associates, 2000c) is available in draft form. The final version of this plan is expected to be finalized through the JAG process before the activities associated with this project begin. The ERAPP supplements the MHASP and details the measures to be taken during a hazardous occurrence. A hazardous occurrence is defined as an event that has the potential to result in, or has resulted in a fatality, injury, property damage, or the release of hazardous materials.

The purpose of the ERAPP is to develop and implement an emergency response mechanism for hazardous occurrences that may arise during site clean-up operations. It presents procedures to address major site emergencies such as fires, explosions, and personal injury accidents requiring the assistance of emergency responders external to the site.

The objectives of the ERAPP are:

- to prevent emergencies and hazardous occurrences through appropriate planning and implementation of proper health and safety procedures;

- to effectively and efficiently protect public health, worker safety, the environment, and property by providing a level of preparedness emphasizing preventative measures and detailed instruction for responding to incidents such as fires, explosions, chemical releases, oil spills, and injuries;
- to provide emergency responders with sufficient information to effectively and safely respond to any emergency on the site; and
- to identify site-specific hazards such that all site workers and emergency responders can be fully informed and respond appropriately and safely to any emergency at the site.

The community has the capability to respond to the nature of emergencies that may occur during the environmental clean-up of the Muggah Creek watershed. Funding for the necessary equipment and supplies to establish an emergency response capability has been provided under the Cost Share Agreement. Further funding will be made available to provide for training and to carry out exercises to ensure the level of response is adequate and protective of the environment and human health including that of the responders.

The presence and quantities of hazardous materials on the site require specific expertise and knowledge for handling which will be included in the ERAPP. The CBRM Emergency Measures Organization has formulated a Regional Hazardous Material Response Team. Specialized training is being given to the team, and a specially equipped truck was delivered in December 2000. A steering committee is investigating the requirements of the response team, the team structure, training and maintenance, associated costs, and other resources required. The committee will recruit members of the response team, provide the necessary training, and acquire appropriate equipment before the start of the project.

On-site spill response procedures are outlined generally in the Emergency Response and Preparedness Plan for the site as a whole (Conestoga Rovers & Associates, 2000a). They will be detailed in the emergency response plans required of contractors for each activity. Spills will be contained and spilled material will be recovered and handled as waste consistent with its nature. Spill response equipment will be staged at the entrances to the site. A stockpile of soil suitable for emergency berm construction will be maintained at a central location on the site. Pumps and other recovery equipment will be available.

As part of the review of each contractor's Emergency Response Plan, all personnel and agencies potentially involved in responding to a hazardous occurrence will attend an emergency response coordination meeting hosted by the PMC. Notification of a hazardous occurrence or of an incident will be made by the PMC to interested and responsible parties in a timely manner, consistent with the nature of the event.

3.0 DESCRIPTION OF EXISTING ENVIRONMENT

3.1 Socio-Economic Environment

The Coke Ovens Site is located in Sydney, one of eight former municipalities now included in the Cape Breton Regional Municipality (CBRM). It is the third largest metropolitan area in the Maritime Provinces with a population of approximately 117,900, and is the commercial centre of Cape Breton Island. There are approximately 26,000 people living within four kilometres of the lower Muggah Creek watershed, including approximately 8,500 children.

Sydney is situated on the south arm of Sydney Harbour and it has a long history as an industrial and transportation centre. Industrial development relating to coke and steel production has taken place in the Sydney area for approximately 100 years, primarily in the Muggah Creek watershed.

The 1999 unemployment rate in Cape Breton as a whole was 17.4 percent (Statistics Canada). This compares with the provincial average of 9.6 percent and the national average of 7.6 percent. Unemployment rates in areas adjacent to the lower Muggah Creek watershed are higher.

3.1.1 Health Concerns

The evaluation of potential human health effects is of importance to the assessment both in terms of protecting the public and protecting on-site workers. The need for rigor is crucial given the pronounced concern for human health issues in industrial Cape Breton in general, and in the project area in particular.

A community consultation project was initiated by Nova Scotia Health in late 2000 to engage the community in an informed dialogue about health concerns related to the Muggah Creek watershed, and to evaluate the issues and strategies to reduce exposure. Relations with the community will be strengthened by incorporating their perceptions of the site and suggestions for ongoing involvement in the public health assessment process. A survey was carried out in the fall of 2000. Results are expected in early 2001.

Reports related to health of the community in the project area completed to date include a mortality study investigating 118 causes of death between 1951-1994 (Band and Camus, 2000), a study evaluating the incidence of cancer between 1981-1998 (Dewar, 1999) and a study on birth outcomes among residents in Sydney and Cape Breton County (Dodds, 1999). The study identified breast cancer in women and colon cancer in males, and in both sexes combined, as being significantly increased in Sydney compared to Cape Breton County excluding Sydney. The mortality data lacks information regarding personal exposure to environmental, dietary, or any other lifestyle factors. Results of the birth outcomes study indicated a small increase in the rate of birth defects. There is a strong public perception that the high rates of cancer are directly attributable to chemical contamination in the area. Additional health studies are underway to further examine these issues.

3.1.2 Noise

Ambient sound monitoring data are not available for the Coke Ovens Site or surrounding areas. Sound levels typically vary between 45 dB and 70 dB in residential areas, based on previous measurements at other locations.

3.1.3 Traditional Use of Resources by Aboriginals

The Membertou Band is a tribal group of the Mi'kmaq Nation. The community of approximately 1000 residents resides on 45.2 ha of land located 1.6 km south of Sydney. The Sydney area is not only the traditional home of Membertou but is also host to a broad representation of people from the entire

Mi'kmaq Nation. The harbour and surrounding lands were used for hunting, fishing, transportation and ceremonial purposes, and comprised both seasonal and permanent settlement lands.

3.1.4 Cultural Resources

A preliminary archaeological assessment of the site indicated that the remaining structures, although interesting from an industrial history perspective, are recognized as unstable and dangerous (Jacques Whitford Environment Ltd., 2000). There are no other known significant cultural resources that could interact with the project.

3.2 Bio-Physical Environment

3.2.1 Climate

The regional climate is characteristic of the Nova Scotia Coastal Lowlands, where winter and summer temperatures are modified by the proximity to the Atlantic Ocean, as well as the prevailing westerly winds. Tables 1 and 2 detail the historical temperature and precipitation normals, as well as wind speed and direction data for Sydney Airport (1961-1990).

Winters are traditionally cold (January mean daily temperature is less than -5°C), but not severe (Environment Canada, 1993). The daily mean temperature remains below 0°C for the months of December through March. The annual average number of days where the maximum temperature is below 0°C is 65 days. Average snowfall amounts are in the order of 330 cm annually while freezing precipitation occurs on 19 days. Spring is late to arrive because of the persistently cold water and it is generally cool and cloudy.

Mean daily temperatures are consistently above freezing by early April. Although temperatures warm rapidly, summers can remain relatively cool (July mean daily temperature is 17.6°C), again due to the nearby ocean. The frost-free period in the Sydney area averages 143 days. Fog occurs in Sydney an average of 78 days per year, most frequently in the period of May to July. Thunderstorms occur an average of 9 days annually.

Figure 4 presents a Sydney Airport wind rose diagram illustrating the percentage of time the wind blows from each direction. Prevailing winds generally blow from the west in winter and from the southwest in summer. During storm events, winds from the southern quadrants tend to dominate. Winds from the easterly directions have the lowest frequency of occurrence. The average annual wind speed, from all directions, is 20 km/hr. Winds are generally the strongest in winter. Maximum hourly speeds of 97 km/hr were recorded in October, December and March with maximum gust speeds of 161 km/hr documented in December. Although wind data is available for an area closer to the site, the data was not used in reviewing this project as the period of record is inadequate.

Table 1. Temperature and Precipitation Normals [1] [2] - Sydney Airport, NS (1961-1990)

Month	Temperature Normals			Precipitation Normals		
	Daily Max. (°C)	Daily Min. (°C)	Daily Mean (°C)	Average Rainfall (mm)	Average Snowfall (cm)	Total Precipitation (mm)
January	-1.3	-9.6	-5.4	75.1	79.5	151.6
February	-2.1	-11.1	-6.5	57.2	70.4	125.1
March	1.2	-7.0	-2.9	68.7	62.5	131.3
April	5.9	-2.2	1.9	97.2	26.4	125.3
May	12.6	2.3	7.5	92.5	5.1	98.1
June	18.7	7.4	13.1	91.2	0	91.2
July	22.9	12.1	17.6	86.2	0	86.2
August	22.7	12.5	17.6	97.3	0	97.3
September	18.2	8.2	13.2	103.2	0	103.2
October	12.6	4.0	8.3	134.9	2.5	137.6
November	7.1	0.0	3.6	145.9	14.7	160.4
December	1.6	-5.7	-2.0	106.9	68.5	172.9
Annual Mean	10.0	0.9	5.5	1156.2	329.5	1480.1

Notes:

1 Normals is the term commonly used for values of climatic elements averaged over a fixed, standard period of years. A 30-year period is used as the standard period and in this instance is from 1961 - 1990.

2. Source: Canadian Climate Normals, 1961 - 1990, The Atlantic Provinces, Environment Canada, 1993.

Table 2. Wind Speed and Direction Data - Sydney Airport, NS (1961-1990)

	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Annual
Wind Speed (km/hr)	23	22	22	21	20	18	17	17	17	20	21	22	20
Most Frequent Wind Direction	W	W	W	N	SW	SW	SW	SW	SW	SW	W	W	SW
Max. Hourly Speed & Dir.	89 E	89 SE	97 E	80 SW	80 SE	76 NE	72 S	61 W	89 NW	97 SE	85 S	97 S	
Max. Gust Speed & Dir.	121 SE	124 SW	129 SE	115 S	109 W	114 N	87 W	89 W	129 N	138 S	129 S	161 S	

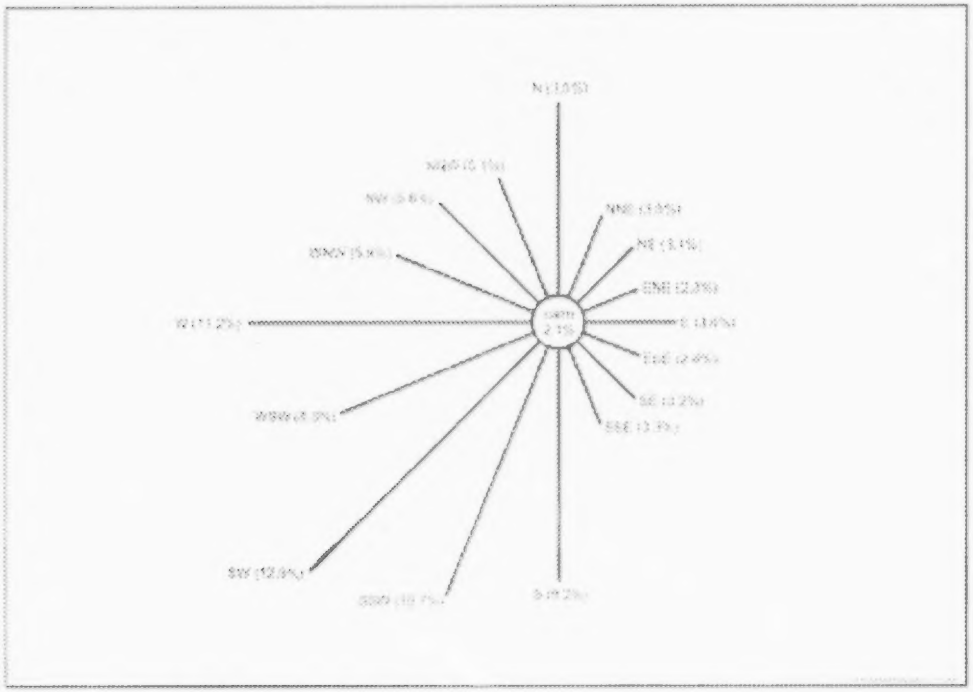


Figure 4. Sydney Wind Rose Diagram

3.2.2 Ambient Air Quality

The air quality within the study area is monitored by both provincial and federal governments, as part of a national system. Air quality monitoring is carried out to determine the concentration of various substances and to compare these levels to accepted standards. The parameters continuously monitored by these stations are sulphur dioxide, nitrogen dioxide, carbon monoxide (CO), ozone (O_3) and total suspended particulate (TSP).

The *Phase I Site Assessment* (CBCL Ltd. / Conestoga Rovers & Associates, 1999) provides a history of ambient air quality monitoring for the Industrial Cape Breton area:

- 1958 - Air quality monitoring began in Sydney by measuring dustfall;
- 1959 - Soiling index added;
- 1961 - Sulphation rate included;
- 1970s - Sulphur dioxide (SO_2) and TSP added;
- 1980s - Coke Ovens Site specific monitoring started, with polycyclic aromatic hydrocarbons (PAHs) the initial focus;
- 1990s - PM_{10} (particulate matter with a diameter of less than10 µm) added at the Coke Ovens Site. Heavy metal parameters and a suite of volatile organic compounds (VOCs) added for the Tar Ponds incineration project monitoring.

A Coke Ovens ambient air monitoring program began in 1998 (AGRA Earth & Environmental Ltd., 2000b) and it currently under review. To date it has consisted of three PAH and TSP/metal monitoring sites, one PM_{10} site located near the perimeter of the site, and four VOC monitoring sites located throughout the industrial Sydney area. A total of 85 parameters were monitored. A review of the results show that the data for these parameters is variable and seasonal trends could not be established. As the database grows, relationships of the data for each parameter to air quality criteria and by season may become more evident.

Some historic data available for these parameters are provided below for comparison purposes (from AGRA Earth & Environmental, 2000a):

- TSP annual average levels have steadily decreased over the past 30 years. In the 1970s, TSP levels throughout the industrial Sydney area were generally around 60 $\mu g/m^3$. The highest levels were at Whitney Pier Fire Station where average levels were in the range of 117-121 $\mu g/m^3$. Annual averages dropped in the 1980s (28 $\mu g/m^3$) and 1990s (20-27 $\mu g/m^3$). The significant reduction over time is likely due to lower production rates at the SYSCO steel mill and the shut down of the coke ovens in 1988.
- Benzo(a)pyrene annual average levels have decreased over the last 20 years. Average benzo(a)pyrene concentrations in 1981-82 were 1.9 ng/m^3. These levels fell to 0.34 ng/m^3 in the early 1990s and to 0.20 ng/m^3 in 1999. These levels compare to annual levels of 0.56 ng/m^3 in suburban/urban Montreal in 1989-90.
- PAH levels from 1989-90 were similar to 1999 levels. Total annual average PAH levels measured in Sydney in the 1990s (33-36 ng/m^3) are approximately half of the levels identified in other urban centres (1989-90) (69 ng/m^3).
- Metals results were generally similar between the 1989-90 and 1999 monitoring periods.

The following observations and conclusions can be made from the results of the 1999 monitoring program:

- Levels of the parameters monitored appear to be consistent with levels identified in typical suburban/urban airsheds throughout North America;
- With the exception of benzo(a)pyrene and cobalt, there were no exceedances to 24-hour criteria for the monitored parameters;
- Benzo(a)pyrene exceedances in winter are likely a result of the influence from home heating point sources located in close proximity to the samplers;
- There were two exceedances (of 57 samples) of the Ontario cobalt 24-hour criteria of 0.1 $\mu g/m^3$ in 1999. These results are being tracked and exceedances compared to meteorological, site and general airshed conditions in order to delineate possible sources. The major sources of cobalt in the atmosphere are coal and residual fuel burning and attrition in the use of superalloys, hard-facing alloys and cemented tungsten carbides (AGRA Earth & Environmental Ltd., 2000b);
- Some PAH compounds (acenaphthene, fluorene, phenanthrene and anthracene) have been measured at higher levels north of the site than at the other two monitoring sites. An analysis of wind influence showed that the influence of the Coke Ovens Site was most evident in the PAH levels north of the site.

Recent studies comparing ambient air concentrations for various parameters between suburban/urban airsheds and the Sydney airshed are provided in Table 3.

Table 3. Summary of Selected Ambient Air Concentrations, Suburban/Urban Airshed Environments

Parameter	Typical Suburban/Urban Airshed [1] Ambient Air Concentrations		Sydney Airshed Ambient Air Concentrations 1998-2000	
	Range [2] ($\mu g/m^3$)	Mean ($\mu g/m^3$)	Range [2] ($\mu g/m^3$)	Mean [3] ($\mu g/m^3$)
TSP	24.0 - 106.0	32	1.45 - 54.94	20.24
PM_{10}	15.0 - 42.0	25	1.49 - 37.26	12.9
Arsenic	0.020 - 0.030	NA	0.00002 - 0.009	0.001
Beryllium	NA	0.001	0.0009 - 0.004	0.0009
Lead	0.085 - 10	0.1	0.0009 - 0.724	0.015
Manganese	0.033 - 0.110	0.033	0.0009 - 0.144	0.018
Naphthalene	0.42 - 4.60	0.94	0.00003 - 0.0175	0.00182
Benzo(a)pyrene	0.00011 - 0.00163	0.0006	3.0×10^{-5} - 0.00712	0.00025
Benzene	16.91 - 101.44	41.08	0.27 - 27.57	3.10
Ethylbenzene	NA	3	0.32 - 9.05	1.43
Toluene	1.0 - 30.0	10.81	0.24 - 66.39	6.8
Xylenes	5.2 - 12	NA	0.42 - 5.34	1.90
Methylene Chloride	0.35 - 18.79	6.7	0.35 - 57.35	5.73

(from AGRA Earth & Environmental Ltd., 2000a, p40)

Notes:

1. Ambient air concentrations for a typical suburban and urban airsheds were based on studies that examined US cities as monitoring sites from American Toxic Substance and Disease Registry (ATSDR), 1999. The exceptions are: TSP (based on an urban environment in Nova Scotia), PM_{10} (based on Canadian cities),.
2. Represents the range of 24-hour average concentrations, whenever possible.
3. The mean values represent long-term (annual average) trends for each parameter at stations near the Coke Ovens Site.

3.2.3 Surficial Features and Topography

The Coke Ovens Site is part of the Muggah Creek watershed, a coastal lowland that drains to the ocean via a relatively flat-bottomed 500 m wide valley formed by Coke Ovens Brook. The ground surface of the site slopes gently from east to west, bounded to the north and south by topographic highs. The 20 to 30 m deep valley slopes upward to the north and south at a 5-10 percent gradient. Coke Ovens Brook flows westward at a gradient of less than 1 percent through the centre of the valley.

Very little of the surficial landforms of the Coke Ovens Site can be considered natural, due to the high level of previous industrial activity. Large areas of the site are covered with permeable, tar-impacted, imported fill materials including sand, gravel, coal, coke, slag, construction rubble and general fill materials. The fill materials range in thickness from 0 to 4 m.

Below the fill deposits, the natural glacial till overburden consists of a dense, reddish-brown, clayey silt (6 to 8 m thick) over Canso group mudstones near the western boundary; and a compact to dense, stoney, brown, silty sand to sand silt (1 to 11 m thick) associated with Morien Group sandstones over the remainder of the site. Generally, overburden thickness decreases from west to east across the site.

3.2.4 Hydrogeology

The fate and mobility of contaminants on the Coke Ovens Site are controlled by the site hydrogeology and the nature of the various compounds. Nolan, Davis and Associates Ltd. and Jacques, Whitford and

Associates Ltd. (1990) provide information on the hydrogeology of the site. More comprehensive evaluations are currently underway as part of the Phase II/III studies.
In general, the water table is 1.5 to 4 m below grade across the site and with the dominant direction of groundwater and contaminant plume movement towards Coke Ovens Brook, and westerly towards the steel plant. The core of an organic plume at the time of the study (1990) was within the boundaries of the Coke Ovens Site, at least to 20 m depth, and it may have been migrating to the west beneath the steel plant to the Tar Ponds and to the north towards Frederick Street. The movement of groundwater will be further defined by the Phase II/III studies.

A wide range of organic concentrations was detected in the groundwater including phenols, benzene, toluene, ethylbenzene, xylene, napthalene, PAHs and heterocyclic nitrogenous compounds. Background organic indicator concentrations were below the detection limits.

3.2.5 Surface Water

The Muggah Creek watershed (approximately 24 km^2) is comprised of two sub-watersheds - Coke Ovens Brook watershed (40 percent of the total area, to the north and east), and Wash Brook watershed (60 percent of the total area, to the south and west). Although the surrounding topography largely consists of rolling hills, the gradient in the brooks is sufficient to provide for fast flowing, turbulent streams.

Surface waters drain via municipal sewers and ditches to Coke Ovens Brook, which empties into Muggah Creek via the Tar Ponds. Mean natural annual flows of Coke Ovens Brook have been calculated at 0.34 m^3/s, with mean annual flood and 100 year flows estimated at 6.2 and 12.8 m^3/s, respectively (Nolan, Davis and Associates Ltd. and Jacques, Whitford and Associates Ltd., 1990).

Coke Ovens Brook drains a highly disturbed urban and industrial area. Over much of its length, the riparian habitat has been destroyed, and replaced with channelized banks, debris and infill. It is questionable whether the brook follows its original course, as it is reported to have been diverted and/or channelized in the past. Generally the brook stream bed material is comprised of coarse gravels and cobbles, interspersed with occasional boulders. As the brook traverses the Coke Ovens Site, and in downstream reaches, portions of the streambed are visibly contaminated with tars. A bright orange precipitate is visible in some areas.

Cagney Brook has also been physically impacted by work which was done at the site. All large vegetation has been removed from the riparian zone. It has been diverted and/or channelized, culverted underneath Mullins Bank before it reaches the site, and the stream substrate is an unsorted mixture comprised of a large amount of fines and some gravel which is not good fish habitat, particularly for salmonids.

Some water quality data is available for the surface waters of the Coke Ovens Brook watershed:

- In the spring of 1998, surface water and sediment quality in Frederick Street Brook was tested for 68 parameters, eight of which exceeded Canadian Council of Ministers of the Environment (CCME) guidelines for freshwater aquatic life, aesthetic; drinking water and commercial uses (CBCL Ltd. / Conestoga Rovers & Associates, 1999);
- In 1996, Britten Research Associates analyzed samples from Domtar Brook adjacent to Whitney Pier Memorial School. Laboratory results from water samples collected indicated levels of aluminum, copper, iron, selenium and zinc above CCME guidelines for freshwater aquatic life.

3.2.6 Flora

The Sydney area lies within Louck's Sugar Maple-Hemlock-Pine Forest Zone, which is heavily influenced by the cool summers and cold winters, local soil conditions and extensive disturbance of the landscape by human activities. In the Muggah Creek watershed, these disturbances have resulted primarily from industrial activities, but residential, institutional, and commercial developments have also contributed to the loss or reduction of habitat. What forest communities remain tend to be dominated by white spruce, black spruce, balsam fir, and larch. Birch, maple and aspen are common on disturbed areas, and along the margins of coal impacted areas. Small marshy areas exist in poorly draining soils and on the margins of the small lakes.

On the Coke Ovens Site, regeneration of vegetation has occurred, largely represented by grasses, wildflowers and other herbaceous species. Along some of the wetter areas of the site, birch groves have begun, with small cattail wetlands and marshy areas.

A total of 223 vascular plants were documented within the area of the Coke Ovens Site and Tar Ponds area (Haber, 1998 and Haber, 2000). These are representative of 46 families, with the largest families being the aster, grass and rose families. This diversity of species includes 19 trees, 23 shrubs, one vine, 177 flowering herbs, 3 ferns or fern allies and one conifer. A high proportion of the plants (45 percent) are exotic species, primarily weeds and commonly cultivated pasture species that have become widely naturalized. A total of 31 percent of the plants are wetland species, attesting to the high water table, frequent occurrence of pools of water and the lengthy shorelines surrounding the Tar Ponds and the banks of Coke Ovens Brook.

3.2.7 Fauna

The urban conditions and the impacted landscape limit wildlife in the area. Species that may be encountered include red squirrel, snowshoe hare, red backed vole, and possibly, deer and or coyote (Haber, 1998). Gulls and songbirds are evident in the area. A variety of other animal species were recorded on the Coke Ovens Site including muskrat, raccoon, fox, rat, mice, ducks, ravens, sparrows, yellow-legs, bald eagle, smooth green snake, green frog, leopard frog, sowbugs, crickets, water striders and bumblebees (Haber, 1998).

A total of six snails, three of which are exotics, and one European slug have been documented. One land snail, the European exotic, *Succinea putris*, is the first record of the species in the Maritime Provinces. Subsequent fieldwork within the region will likely show that these species are much more widely distributed than present records indicate and occur also outside the confines of the present study site (Haber, 2000).

Notwithstanding the expected chemical and biological limiting factors, small fish and amphibians have been observed in both the stream and marshy areas of the watershed, including downstream reaches of Cagney's Brook.

3.2.8 Species at Risk

The Atlantic Canada Conservation Data Centre provided a scan of its data records to assist in determining whether species at risk were likely to be present in the project area. No rare animal species were identified in the project area. Two species of rare plants, wild chive and a variety of grass, are known to occur in the project area. Neither of these species were identified in the recent on-site botanical surveys (Haber, 1998 and Haber, 2000).

4.0 PROJECT / ENVIRONMENT INTERACTION

Under the *Canadian Environmental Assessment Act*, every screening of a project must include consideration of the environmental effects of the project, including the environmental effects of malfunctions or accidents that may occur in connection with the project, and any cumulative environmental effects that are likely to result from the project in combination with other projects or activities that have been, or will be, carried out. An environmental effect is defined as any change that the project may cause in the environment, including any effect of any such change on health and socio-economic conditions, on physical and cultural heritage, on the current use of lands and resources for traditional purposes by aboriginal persons, or any structure, site or thing that is of historical, archaeological, paleontological or architectural significance. It also includes any change to the project that may be caused by the environment.

The environmental assessment must determine whether the project is likely to cause significant adverse environmental effects. The determination that adverse effects are significant is taken only after mitigation measures are taken into account. Criteria such as magnitude of effects, geographic extent, duration and frequency, irreversibility, and ecological context are traditionally used.

4.1 Initial Environmental Screening

All environmental effects associated with this project were initially screened and characterized as either beneficial or adverse (see Table 4). The criteria used to further describe the effect was magnitude/extent and duration. These decisions were based on the information provided in the reports or studies relating to the project and on professional judgement. The criteria are defined as follows:

magnitude/extent of potential effect:

minor effect -	a very localized effect that is difficult to measure
moderate effect -	a localized measurable effect
major effect -	a measurable effect that extends beyond the site boundaries

duration of effect:

short term -	the term of the project (less than 18 months)
long term -	longer than the term of the project (more than 18 months).

The conclusions that can be drawn from the initial screening of this project are:

- There are eight beneficial potential effects of the project (two of them are major, long term); and
- There are seven adverse potential effects of the project (two of them are major, long term).

Two other qualitative positive effects have been identified that are not included in Table 4. The community will see a start to the clean-up of the site, and removal of a number of eyesores, which will positively affect the well-being of the members of the community. Also, workers will have the opportunity to gain new skills that they may be able to use on other work sites both in and out of Cape Breton.

Table 4 Initial Environment Screening

Environmental Component	Character Of Potential Effect	Magnituded / Extent of Potential Effect	Duration of effect	Comments
Public Health and Safety	Adverse	Major	Long term	Project activities pose potential health risks to the public.
Workers Health and Safety	Adverse	Major	Long term	Project activities pose potential health risks to the workers.
Socio-Economic Conditions	Beneficial	Moderate	Short term	Because of the varied nature of the work to be completed on-site, there will be a need for several contracts. This breakdown will provide opportunities for local businesses to bid on contracts of manageable sizes.
	Adverse	Moderate	Long term	Damage is expected to municipal roadways from truck traffic during the term of the project.
	Beneficial	Major	Long term	The project is one step in a phased appraoch to remediating the Coke Ovens Site and imporoving the environmental quality of the Muggah Creek Watershed.
Quality of Life (noise & dust)	Adverse	Moderate	Short term	The project will result in an increase in truck traffic with related stress effects from noise and dust to some people during the term of the project.
	Beneficial	Major	Long term	The project is one step in a phased approach to remediating the Coke Ovens Site. Remediation of the site will eventually remove this source of concern.
Use of Resources by First Nations People	Beneficial	Minor	Long term	The degraded urban/industrial environment, restrictions on coke Ovens Site access, and limited extent of off-site biophysical effects preclude any significant effect on the current use of resources by First Nations people.
Cultural Resources	Adverse	Minor	Long term	There is little heritage potential in the site. What remains is both unstable and dangerous.
Air Quality	Adverse	Major	Short term	Adverse effects on and off-site are possible during the term of the project. These are considered further under Public Health and Safety.
Surficial Features	Beneficial	Minor	Long term	Coke Ovens Site clean-up may very marginally decrease risks to soil quality over the long term.
Hydrogeology	Beneficial	Minor	Long term	Coke Ovens Site clean-up will marginally decrease risks to groundwater quality over the long term.
Surface Water	Adverse	Minor	Short term	Potential water quality impacts could be measurable especially in relation to spills during the term of the project.
	Beneficial	Minor	Long term	Potential improvements in long term surface water quality are expected.
Flora and Fauna	Beneficial	Minor	Long term	This site has been used for heavy industry for the past 100 years and provides no significant habitat. Completion of the project will provide minor long term benefits to habitats.

The discussion and assessment of significance that follows focuses on the environmental components where potential adverse effects are predicted:

- public health and safety (including air quality);
- worker health and safety;
- socio-economic conditions (damage to roadways);
- quality of life (noise and dust);
- cultural resources; and
- surface water.

Because of the community concerns for public health and safety related to this project, those potential adverse effects are discussed first.

4.2 Adverse Effects of the Project on Public Health and Safety

4.2.1 Development of Interim Separation Zones

AGRA Earth & Environmental Ltd., (2000b) assessed the interaction of most of the project activities with the existing environment, in the development of interim separation zones. The interim separation zones were developed to ensure adequate separation between the demolition and removal activities and adjacent land uses. In order to do that, AGRA Earth & Environmental Ltd. evaluated the chemicals of potential concern, the potential receptors, and exposure pathways of those chemicals. The resulting interim separation zones identify those areas where ambient air quality criteria specific to this project could potentially be exceeded and where adverse environmental effects may potentially be expected. The study focused on those air quality effects that potentially affect human health. The remainder of this section is largely a summary of those results.

Chemicals of Potential Concern

Results of environmental reports done specifically for this site were used to identify the chemicals of potential concern (COPCs) present in the on-site soil, water and air. The list was screened against a wide variety of criteria to determine which specific chemicals might represent potential health concerns. Additional COPCs were selected based on the comparison to CCME guidelines, the results from the air monitoring program (AGRA Earth & Environmental Ltd., 2000b), and a supplementary air quality field program. This initial compilation of COPCs resulted in a significant number of chemicals (38) to consider.

It was impractical to conduct an assessment of all of these chemicals. To address this issue, the accepted practice of grouping chemicals based on their structure was used to divide the identified COPCs into organic, inorganic, and miscellaneous classes. The organic class was then divided into two groups, chlorinated and non-chlorinated. Representatives of each of these groups were selected for detailed examination in this report. The final list of substances of potential concern considered in this assessment is found in Table 5.

Potential Receptors

Residential properties located on Frederick Street, Currys Lane, Tupper Street, Vulcan Avenue (and side streets to the north), and Victoria Road were identified as the primary locations of potentially exposed individuals with the strongest likelihood of off-site exposures from the project activities. Most of the residents along Frederick Street and Currys Lane were previously relocated. Exposures to all ages with varying sensitivities, including children and the elderly, were examined in the analyses.

Table 5. Final Substances of Potential Concern and Ambient Air Criteria

Chemical Class	Chemical Group	Representative Chemical	Recommended Ambient Air Criteria ($\mu g/m^3$)	Reference (see notes).
ORGANIC	Nonchlorinated	Benzene	7.0	ATSDR
		Toluene	760	Health Canada
		Ethylbenzene	200	USEPA
		Xylenes	36	Health Canada
		Benzo(a)pyrene	22.4	Health Canada
		Naphthalene	3	USEPA
	Chlorinated	Methylene chloride	200	ATSDR
INORGANIC	Not Applicable	Arsenic	0.0034	USEPA
		Beryllium	0.02	USEPA
		Lead	0.83	CalEPA
		Manganese	0.04	ATSDR
OTHER	NOT APPLICABLE	Asbestos	0.003 f/mL	USEPA
		PM_{10}	25	CCME

from AGRA Earth & Environmental Ltd. (2000a) p 30

Notes:
ATSDR - US Agency for Toxic Substances and Disease Registry
USEPA - US Environmental Protection Agency
CalEPA -California Environmental Protection Agency
CCME - Canadian Council of Ministers of the Environment

Human Exposure Pathways

The assessment of exposure pathways considers how humans can be exposed to a chemical. There are three routes--ingestion, inhalation, and dermal (skin) absorption. There are several factors to consider in determining whether exposure to a specific chemical could result in adverse effects to humans including, but not limited to, total dose, dose rate, duration of exposure, additional exposures to the same or other chemicals, route of exposure, and an individual's susceptibility.

The substances can potentially travel by air, surface water, or groundwater from the site to potential off-site receptors. Access to the site will be restricted to occupational activity (*i.e.*, demolition and removal work) and direct skin contact with chemicals on-site by the residential population is not anticipated.

Contaminants will be released primarily from demolition of structures and/or handling of materials (e.g. excavation, trucking, etc). The site activities are expected to generate fugitive emissions of particulate matter, as well as to enhance the potential volatilization of organic compounds in the waste materials to the atmosphere. Contaminated soil particles may also carry trace metals and organics that have been attached to the particle surfaces. The particulates and volatilized organic compounds might disperse off

the site and into the neighbouring residential areas. The chemicals may then be inhaled by the residents of these areas, creating a potential human health hazard.

In addition, the particulates that travel off-site may be deposited on the soils and surfaces of the residential properties. The deposited particulates may then be a source for exposure through direct contact, inhalation of resuspended dust, or ingestion of homegrown garden produce. The ingestion of homegrown garden produce was investigated. The study experienced a number of problems and results were not conclusive. Dermal contact and re-suspension of dust are minor exposure pathways. Incremental exposure through these routes, resulting from the site activities, is expected to be minimal due to the relatively short duration of the project.

Surface water transport of the substances is considered a potential secondary route for exposure. Project activities may deposit substances into surface water streams through deposition of particulates or surface erosion. Surface waters on-site generally drain, via Coke Ovens Brook, into Muggah Creek. Since the project will be of short duration, the deposition of substances into surface waters will be limited in quantity. Additionally, since the water that flows into Muggah Creek is not used as a potable water supply and human contact with the surface water is limited, it is not likely that this exposure route will have a significant effect on the resident population.

Groundwater transport of substances could be a concern if the project has an effect on the subsurface environment and its underlying contamination. Based on the limited groundwater use within the general vicinity of the site, it is not likely that this exposure route will have a significant effect on the residential population.

In summary, for this project, the primary route of exposure for humans is considered to be by airborne transport and inhalation of substances.

Modeling of Interim Separation Zones

The demolition of structures on-site will create airborne particulates, as well as other substances that may be attached to particulates, eventually migrating off-site. The excavation of materials, as well as the subsequent removal of these materials from the site by trucks, will also generate additional airborne emissions. To ensure air quality beyond the site boundaries was not impaired to the point that it would pose a risk to nearby residents, health-based project-specific air quality criteria were derived. These criteria used conservative exposure assumptions and toxicity factors. They also took into consideration ambient air quality in the area of the project. The ambient air criteria used in developing the interim separation zones for each chemical of potential concern are included in Table 5 above.

The interim separation zones were derived with a U.S. government approved dispersion model using the final COPCs (from Table 5) and the emission rates calculated for each of the site activities to simulate the concentration in the air. The computer model identifies areas where the ambient air criteria could be exceeded. The model was run for 24-hour and 1-year periods for all of the COPCs, resulting in over 100 individual computer simulations. The results of the computer modeling are summarized in Figure 5. The shaded area in Figure 5 represents areas where ambient air quality criteria specific to this project could potentially be exceeded and where adverse environmental effects may potentially be expected. Distinct interim separation zones were determined for each of nine activities. Figure 5 represents a composite of the nine zones. Restrictions on scheduling of the nine project activities (Section 4.5.1) will have the effect of making the interim separation zone less extensive, at any one time, than that portrayed in the figure.

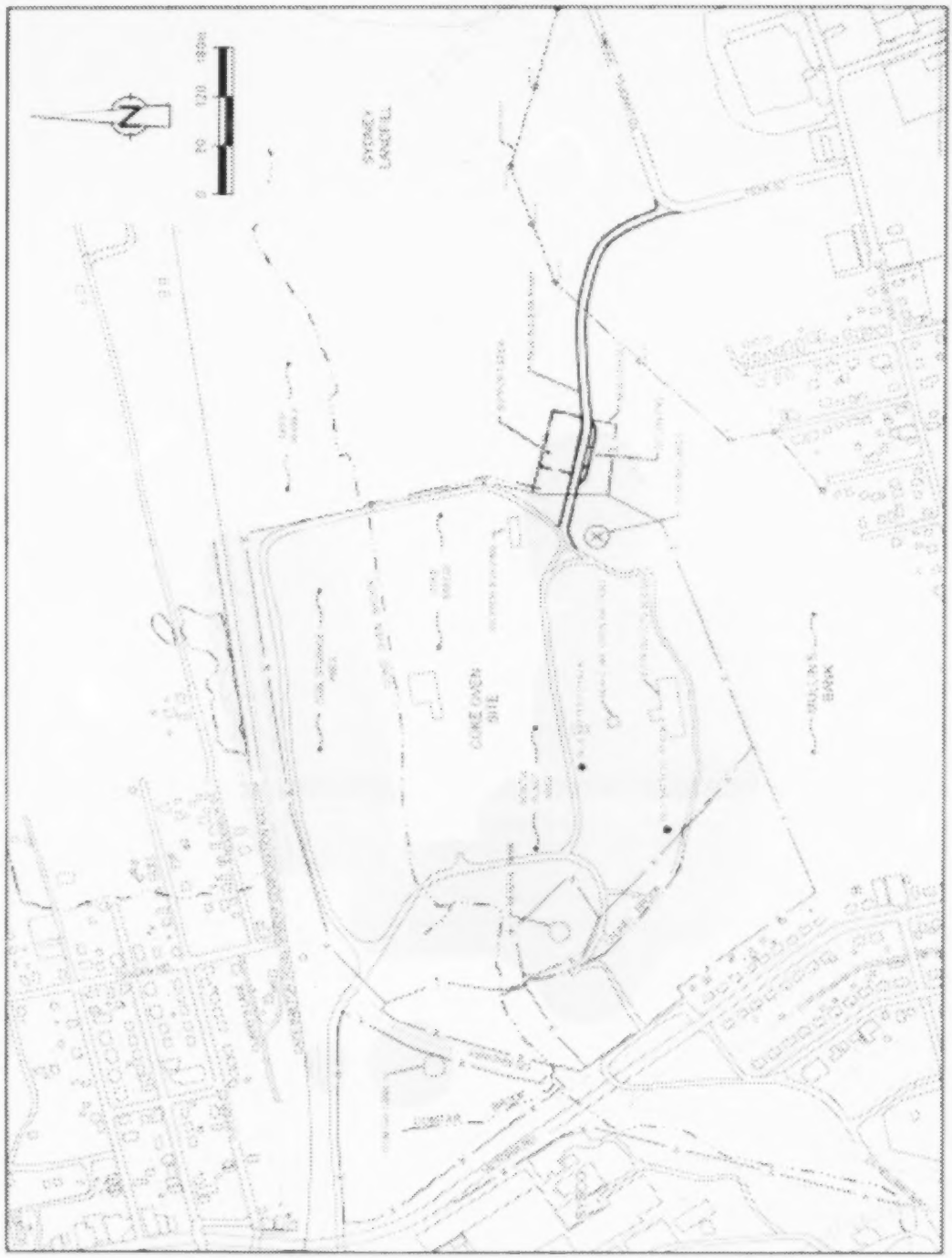

N
0
80
120
160
SYDNEY HARBOUR
COKE OVENS SITE
BRAS D'OR LAKE

Figure 5. Composite of the Separation ZonesUncertainties and Assumptions

There were several uncertainties and assumptions necessary in the development of the interim separation zones. These uncertainties included incomplete chemical characterization of the site, extrapolation of animal studies to humans, characterization of inorganic chemicals, exposure times and durations, behaviour patterns and characteristics of the people, previous exposures, multiple chemical exposures, and incomplete site-specific wind conditions. Although these uncertainties exist, adopting an err-on-the-side-of-caution approach minimized them.

Examples of the use of cautious or conservative measures in the development of the interim separation zones are:

- No attempt was made to limit site activities to periods of favourable wind directions *i.e.* a full 5-year meteorological file was used to calculate the areas of potential effects;
- The lowest of available air quality criteria was applied to air concentration estimates;
- The computer model used and the air quality criteria selected are conservative in nature;
- The upper levels of contaminants found in the various site materials were used; and
- 24-hour maximum exposures were used although project activities will be limited to daylight hours only.

Given the conservative features of the modeling, the interim separation zones as portrayed in Figure 5 represent "worst case" scenarios of air quality effects resulting from the proposed project, provided that the standard dust control measures are in place (see following section).

4.2.2 Assessment of Individual Demolition and Removal Activities

The computer modeling done by AGRA Earth & Environmental Ltd. (2000a) in developing interim separation zones, and the initial screening of environmental effects (Table 4), indicates that there is potential for adverse environmental effects resulting from the proposed activities. The activities that have the greatest potential for effects on human health and safety are described in the following sections. Mitigation that generally applies to demolition and removal activities is also described, as are additional mitigation measures specific to certain activities.

Domtar Tank and Contents

Exceedance of short-term health-based air criterion for benzene outside the site boundary could occur, if mitigation is not used. The original interim separation zone for benzene released from this activity approached Currys Lane, a residential area north of the site, and extended to Victoria Road. This extended interim separation zone assumed that the sludge was a solid and that benzene emissions would occur throughout its mechanical removal. Subsequent testing of the sludge by the PMC has confirmed that the sludge is not a solid mass but rather a hydrocarbon saturated loose sand.

Despite the more updated knowledge on the nature of the sludge (and of the even more fluid overlaying slurry layer), a containment cover for potential emissions will be added to the tank prior to the initiation of the content removal. The removal of Domtar Tank contents will occur within an air-tight enclosure that will be erected to contain and capture organic vapours (see Section 2.2.2). This measure is expected to reduce benzene emissions by 90 percent and will ensure that residents are not exposed to unacceptable concentrations of benzene. This redesign of the project allows for the determination that the potential adverse effects are not significant.

Exceedance of the PM_{10} criterion from trucking of the Domtar Tank contents away from the site is possible. Exceedances may occur in the area northwest of the site, encompassing a vacant portion of the railway right-of-way, just outside the site boundaries. The exceedance is predicted to last for no more than three weeks.
No occupied residential properties should be affected and no mitigation beyond the standard dust control measures described below is necessary. The adverse effects are therefore not considered significant.

Coal Stockpiles
Removal of coal during the 1998 clean-up led to complaints from Frederick Street residents of off-site migration of particulate material. This eventually led to premature shut-down of clean-up activities. The mitigation and monitoring measures presently proposed go beyond those in place in 1998. These controls, together with the professionally managed supervision provided by the PMC, will prevent a recurrence of problems.

The AGRA modeling indicates that short-term health-based air criterion for PM_{10} would be exceeded from activities associated with removal of the coal piles. The exceedance could extend outside the site boundary, including a portion of the south side of Frederick Street. However, there are no longer any residences within the area of the predicted air-quality exceedances, therefore the adverse effects are not considered significant. No mitigation beyond the standard dust control measures described below is necessary.

Although unlikely, the PMC may determine through the contract tendering process that the transport of coal and coke by rail is the preferred removal option. This activity will be similar to trucking but has not been fully assessed for potential environmental and health effects. Rail transport of coal and coke will not be allowed to proceed until it has been demonstrated to the satisfaction of Environment Canada that the potential environmental and health effects resulting from the removal by rail has been evaluated, compared to those resulting from removal by truck, and determined to be at acceptable levels. Environment Canada will consult with JAG and the other government parties before accepting or rejecting the evaluation.

Stacks Demolition/Disposal
The two stacks were originally scheduled to be demolished with the use of explosives. The safety zone recommended for implosion extended into a residential area to the south of the site. An alternative method of demolition of the stacks —working with manual or pneumatic tools—was considered and adopted. No off-site exceedances of air quality criteria associated with manual dismantling of the stacks are expected, so the adverse effects of this method are not considered significant.

Cooling Tower Grids Removal
Exceedance of short-term health-based air criterion for PM_{10} is possible from trucking the cooling tower grids material from the site. The exceedances may occur to the south into the vacant Mullins Bank. (Although Mullins Bank is part of the fomer Coke Ovens site, the propery is now owned by CBDC. For this reason separation zones extending into the area were considered exceedances.) The exceedance is predicted to last for approximately one day. No mitigation beyond the standard dust control measures described below is necessary. The adverse effects are not considered significant.

By-Products Building Demolition
Exceedance of short-term health-based air criterion for PM_{10} is possible from demolition and trucking. The exceedances may occur to the south into the vacant Mullins Bank. The exceedance is predicted to last for no more than one month. No mitigation beyond the standard dust control measures described below is necessary. The adverse effects are not considered significant.

Exceedance of short-term health-based air criterion for manganese may occur to the south into the vacant Mullins Bank. The exceedance is predicted to last for no more than one month. No mitigation beyond the standard dust control measures described below is necessary. The adverse effects are not considered significant.

Standard Dust Control Measures

Specific mitigation measures will be undertaken, as described above and as described in association with the various activities in Section 2. Standard dust control measures will be undertaken for all activities occurring on-site to minimize the air-borne releases of substances. They will consist of:

- continual use of water sprays;
- re-surfacing roads with aggregates; and
- limiting work to maximum wind speed gusts of 70 km/hr and hourly wind speed of 35 km/hr.

4.3 Adverse Effects of the Project on Other Components of the Environment

4.3.1 Worker Health and Safety

As part of the overall management of health and safety activities relating to the environmental clean-up of the Muggah Creek watershed (see Section 2.6), a Master Health and Safety Plan has been prepared, and project-specific health and safety plans will be prepared by individual contractors. The processes and plans as established and proposed are judged to be satisfactory to protect worker health and safety. No additional measures are required to ensure that the potential adverse effects are not significant.

4.3.2 Socio-Economic Conditions

Damage to municipal roadways from truck traffic is a potential adverse effect. Victoria Road, to the west side of the site, is a major transportation corridor north to the communities of Whitney Pier and others along Sydney Harbour. To the south of the site, Prince Street leaves downtown Sydney, becomes Welton Street, then Grand Lake Road, leading to the airport and the provincial highway system to the east. There are no roads to the east of the site, as this is the location of the MAID site. There are neighbourhood streets to the north of the site. It is expected that truck traffic to and from the project site will result in damage to municipal roadways.

> *Required Mitigation*: The provincial spring weight restrictions will apply to project trucks travelling on municipal roadways.

CBRM has advised that the residual damage expected is within the normal acceptable rate. Therefore, given mitigation, the potential adverse effects are not considered significant.

4.3.3 Quality of Life

Noise Levels

Sound levels in urban areas typically vary between 45 and 70 dB. The noise levels experienced at various residential locations during site activities will depend upon several factors. These include the frequency and duration of equipment use, the combination of equipment used, the distance from the source, the absorptive capacity of ground materials, and the topography of the general area. Additional reductions in noise levels will occur because of vegetation, wind, temperature, topography, and several other factors.

The AGRA Earth & Environmental Ltd. (2000a) report indicates that typical noise levels created by project activities will be between 80 and 85 dB (measured 15 m from source), although this will vary with the individual activities. Attenuation due to distance will reduce this level to approximately 71 to 76 dB at 120 m, with additional attenuation likely due to additional factors such as topography.

The project activity to take place closest to a residential area is removing the coal piles. Currently, the closest occupied residence to the coal pile is on Frederick Street, more than 100 m away.

The proposed activities at the site may result in a noise level of 70 dB or less at that residence. Demolition of the By-Products Building may generate loud noises and may affect residences that are approximately 300 m distant. Noise levels at other residences are estimated to be less than 70 dB during the site activities.

Required Mitigation: Activities will be restricted to 7 a.m. to 7 p.m. and to daylight hours.

Given mitigation, the potential adverse effects are not considered significant.

Trucking

Truck traffic carrying materials from the site will be directed to the MAID site, a waste transfer station within Nova Scotia, or a disposal site outside the province. Removal of the residual materials from the site will occur through the Victoria Road or Teak Street gates. The new Teak Street access road may not be constructed by the time the project begins. Until it is ready, traffic going to the MAID site will use the Victoria Road/Welton Street/Grand Lake Road/Deacons Lane route. Once the new access is available, the route will be via Tea'. Street/Vulcan Avenue/Maple Street/Grand Lake Road/Deacons Lane (see Figure 6). This will significantly reduce truck traffic through residential neighbourhoods. Traffic directed to sites outside of Sydney will use Grand Lake Road to access the Sydney By-Pass highway.

The quantity of truck traffic travelling these corridors through Sydney will be significant. Effects will be minimized as some of the individual activities on-site will be undertaken sequentially, rather than concurrently. AGRA Earth & Environmental Ltd. (2000a) estimated trucking from the site to occur over a total of 195 days, with a maximum of 10 trucks to be employed removing materials from the site at any one time, and each truck making three round trips per day.

Accidents related to trucking on highways and urban roads have a very low frequency. Based on traffic accident statistics, the truck traffic on urban roads related to this project will not be at a level where accidents or associated injuries are expected. Dust and noise will be generated along the trucking corridors from these activities and nuisance effects will be experienced.

Required Mitigation:

- Transport routes will be assigned and followed. Heavy trucks will enter and exit the site through the new access road located in a light industrial area. The road will leave the site at the eastern end and provide the most direct possible access to the local landfill and the arterial highway network. There should be no heavy truck traffic through residential neighbourhoods.
- A permanent, concrete equipment decontamination pad with high-pressure washing, and wastewater treatment facilities will be used to wash all vehicles prior to exiting the project site. This will minimize dust problems.
- Solid waste loads will be covered with dust-tight tarps to prevent dust and debris from escaping.

Scheduling restrictions related to sequencing of activities on-site will be implemented. Should the new access road not be available when site activities commence, modified mitigation measures may be necessary and will be considered through the review of the Environmental Management Plan.

Given mitigation, the potential adverse effects are not considered significant.

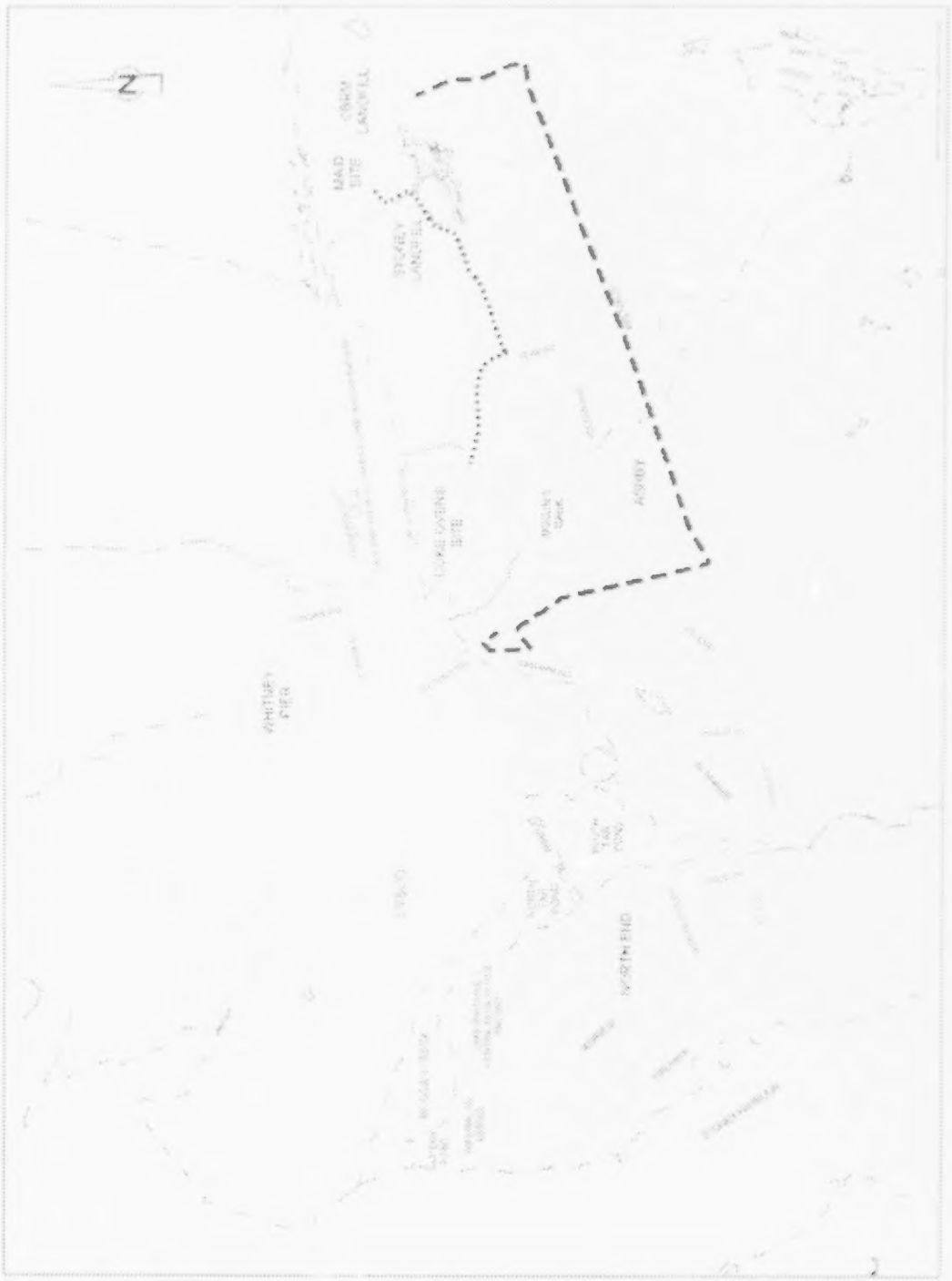


Figure 6. Trucking Routes to MAID Site

4.3.4 Cultural Resources

Due in part to industrial uses of the past, there is little remaining on-site that has cultural value. There are, however, a few structures with potential industrial-heritage significance (Jacques Whitford & Associates, 2000). Likely the most significant is the Coke Ovens Battery No. 1 facility. Building remains associated with the development of Battery No's 2 and 3, including the By-Products Building, may also have moderate heritage value. However, since much of these buildings has already been torn down, what remains is both unstable and dangerous.

> *Required Mitigation*: Given that there is little possibility that the site could be redeveloped as a heritage tourism destination, a detailed photographic record of the remaining structures will be assembled prior to demolition. The photographic record will be provided to the most appropriate local and/or provincial museum.

Given mitigation, the potential adverse effects are not considered significant.

4.3.5 Air Quality

It is expected that some air quality criteria for protection of human health will be exceeded during project activities, both on-site and off-site. Impaired air quality is foremost a human health concern. The potential air quality effects are, for the purposes of this report, considered under "Public Health and Safety" and "Worker Health and Safety" (see Sections 4.2 and 4.3.1).

4.3.6 Surface Waters

Existing water quality on-site is seriously degraded due to past and ongoing practices. Nevertheless, measures will be taken to prevent further surface water degradation. These measures relate to wastewater treatment and disposal, the Emergency Response and Preparedness Plan, and erosion and sediment control measures, all of which have been described previously. In addition, road construction and other activities will rely on guidance provided in the provincial government's *Erosion and Sedimentation Control: Handbook for Construction Sites* (1988).

Given mitigation, the potential adverse effects are not considered significant.

4.4 Effects of the Environment on the Project

The weather on any given day in Sydney will have an effect on the project. The most critical factor will be wind. The modeling of air quality effects used the long-term average meteorological conditions and is therefore calculated conservatively. The wind rose diagram for Sydney (see Figure 4, Section 3.2.1) and Table 1 (Section 3.2.1) show that winds from the southwest quadrant predominate during the months that work will be underway. These conditions are favourable for minimizing interim separation zones in most off-site locations, thereby preventing related health-related effects.

Meteorological conditions on-site will be important in relation to the use of water sprays on structures and roads to prevent PM_{10} exceedances. During the winter months (December through March), the daily mean temperatures are below $0^{\circ}C$. The use of water sprays will cause icy conditions that could make operations difficult. Project activities could start in mid to late winter with construction of the required infrastructure. Demolition activities that require water sprays will not be required until spring. Should activities extend beyond December 2001, it will be necessary to shutdown operations until spring 2002.

All piping for the wastewater treatment systems on-site will be laid on the surface. This requires that the work be conducted in non-freezing conditions of spring, summer and fall. However, as freezing weather can be encountered in early spring or late fall, the temporary water treatment system will be housed in an enclosure that can be heated to protect the carbon units from freezing. Water pipes will be drained at the end of each day to prevent ice build-up.

Site activities will be controlled during periods of unfavourable weather conditions that create excessive dust as well as poor dispersion of emissions from demolition activities. Wind speed and direction will be monitored and recorded continuously on-site and work schedules will be based on weather forecasts.

4.5 Cumulative Environmental Effects

The assessment of the cumulative environmental effects of this project has two parts. The first is the cumulative effects of individual on-site activities that comprise this project. The second is the cumulative effects of this project in association with other projects that comprise the environmental clean-up of the Muggah Creek watershed, and other projects planned for the Sydney area.

4.5.1 Individual On-Site Activities

The cumulative air quality effects of the various demolition and removal activities were considered as part of the Interim Separation Zone Report (AGRA Earth & Environmental Ltd., 2000a). Background air quality was assessed and adjustments were made to the project-specific air quality criteria to reflect existing conditions.

The separation zone predictions were based upon assumptions that each of the proposed activities would be carried out separately and sequentially (i.e. none of the activities will overlap). Following completion of the modeling for the Interim Separation Zone Report, the PMC (using dispersion modeling data provided by AGRA Earth & Environmental Ltd.) evaluated the changes in air quality that could result from two separate sets of concurrent demolition and removal activities. The sets were:

- Domtar Tank contents removal and demolition, and stacks demolition and removal;
- Demolition and removal of By-Products Building, Benzol Tank, Sulphur Building, cooling tower grid debris, and coke batteries.

Using the same procedures as those used previously to determine the individual interim separation zones, the PMC derived new interim separation zones for both sets of concurrent activities. The results, presented in Figures 7 and 8, demonstrate that the concurrent activities can be performed without exceedances of ambient air quality criteria in residential areas. Consequently, the individual activities in each set may take place concurrently; the two sets of activities will be carried out sequentially.

The Environmental Management Plan will require scheduling of project activities. The cumulative environmental effects of the project itself will not be significant provided this requirement is implemented.

Figure 7. Interim Separation Zone: Domtar Tank and Stack Removal (No Implosion)

Figure 8. Interim Separation Zone: By-Products Building, Benzol Tank, Sulphur Building, Cooling Tower Grid Debris, and Coke Batteries

4.5.2 Other Projects

Several other projects that are planned as part of the environmental clean-up of the Muggah Creek watershed could interact with this project. These include:

- *Muggah Creek Interceptor Sewer Project* - construction, operation, and decommissioning of a sewer collector system and related facilities to intercept flows from approximately 30 existing outfalls surrounding Muggah Creek and the Tar Ponds. The interceptor sewer will eventually convey sanitary sewage from all of Sydney to a proposed wastewater treatment plant at Battery Point.This is a 2-year project to begin in the spring of 2001. An environmental assessment of this project was completed in March 2000.
- *Municipal Landfill Leachate Management Project* - decommissioning and capping of a portion of the MAID site to minimize leachate and control surface runoff. This project is scheduled to begin in July 2001 and to be completed by the end of 2002. The project's environmental assessment is expected to start shortly.
- *Technology Demonstrations* - pilot scale demonstrations of potential technologies for transporting and treating Tar Ponds sediments. This project may begin in the fall of 2002 after the completion of this project.
- *Tar Cell Stabilization* - covering of the remains of a shallow lagoon on the Coke Ovens Site that received coal tar overflow from aboveground storage tanks. This project is intended to be a temporary measure in advance of full remediation, and may commence concurrently with the Coke Ovens Site clean-up, subject to an environmental assessment.
- *Tar Ponds/Coke Ovens Site Remediation* - this is the culmination of the environmental clean-up of the Muggah Creek watershed. It will not be fully defined until all other projects and studies are complete and will only commence subject to an environmental assessment and allocation of sufficient resources.

Other projects in the watershed that are not part of the environmental clean-up of the Muggah Creek watershed will include the following:

- CBRM is proposing construction of waste containment cells for the east side of the MAID site. Construction may take place in the spring of 2001.
- NSTPW is continuing to upgrade and twin Highway 125 from Balls Creek to Grand Lake Road in the CBRM. It is possible that a small section in vicinity of Sydney River may be constructed within the next two years. It is expected that road building materials would come from quarries in the immediate vicinity. Truck traffic in the area of the site is not expected.
- CBDC has a large number of industrial properties in the Sydney area and is currently engaged in a divestiture program. Transfer of properties may involve site remediation activities within the Muggah Creek watershed. However, CBDC is in the early stages of its program, has established no definitive remediation plans, and has no schedule of activities.
- The Victoria Park Armoury in the North End of Sydney is currently developing a greenbelt/sports field and upgrading a road. Activities are nearing completion.

Due to the time frame and the localized effects expected from this project, and the lack of certainty and details on others, the following projects will be given no further consideration in the evaluation of cumulative effects: Technology Demonstrations, Tar Ponds/Coke Ovens Site Remediation, MAID Site Containment Cells, Highway 125 Construction, CBDC site remediations, and Victoria Park Armoury construction. The remaining three projects (Muggah Creek Interceptor Sewer Project, Municipal Landfill Leachate Management Project, and Tar Cell Stabilization) were considered in relation to the potential effects of this project (Table 4).

The conclusion is that there are potential adverse cumulative effects related to trucking, more specifically to noise or damage to municipal roadways. This results from overlapping schedules and trucking routes. Total truck traffic on urban roads related to the cumulative projects on this site should be less than

200,000 km. The increased risk of accidents or associated injuries due to this level of increased traffic is not considered significant.

The Muggah Creek Interceptor Sewer Project consists of two main branches, the first from Battery Point along the southwest side of the Tar Ponds as far as Brookland Street. Construction activities here should not affect, or be affected by, trucking related to Coke Ovens Site clean-up activities. The second branch extends from Ferry Street along Cape Breton Street, to Victoria Road. Sewer construction and related trucking here could interact with traffic leaving the Coke Ovens Site. However, the number of trucks hauling materials to and from the sewer corridor is not excessive, and they should not contribute significantly to trucking-related cumulative effects.

The potential safety problem of trucks entering and leaving the Coke Ovens Site at the same time as sewer construction activities are underway has been considered by CBRM. The concern is minor and can be easily addressed through sewer project scheduling.

The Municipal Landfill Leachate Management Project entails closing and covering one area of the MAID site. Large volumes of fill will be required to cover the 23 hectare area. The initial cover will be granular materials, some of it slag. This will occur in the early stages of the project and could require up to 300-350 trucks per day for approximately three months in the initial construction season of the landfill closure project. After the slag layer is in place, a somewhat larger combined volume of sand and gravel, till, and clay fill will be trucked to the site from sources to be determined. Likely, these trucks will travel from outside of Sydney to the landfill site via the Sydney By-Pass and Grand Lake Road. The slag may be placed during the term of this project. The volume is not known at this time but it will be trucked along the Victoria Road/Welton Street/Grand Lake Road corridor. The remaining materials may be placed near the end of, or after, this project is completed.

Recognizing the problems associated with truck traffic, a new branch of the new access road was designed to go directly from the Coke Ovens Site to the MAID site (see Figure 6, Section 4.3.3). This new route will reduce the volume of trucks on city streets resulting from this project and possibly from other projects as well. As noted previously, there is a possibilty that the new access road may not be available when project activities begin.

Tar cell stabilization will involve trucking of cover materials to the Coke Ovens Site. Additional details are not presently available.

In an effort to further reduce the potential adverse cumulative effects of trucking, Environment Canada gave consideration to modifying the project by levelling the coal piles rather than trucking the materials off-site. The coal was proposed for removal as it presents a safety risk to the public by attracting unauthorized individuals to the site who remove the coal for personal use. Levelling the material with the application of a soil cover could be as effective as removal in addressing the safety problem. It could also be completed more quickly. However, removal is supported by the fact that coal (and coke) is a sulphate-generating contaminant source that has generated, and continues to generate, a contaminant plume. The plume poses a long-term risk to the underlying aquifer. However, removal will only lessen (not eliminate) that risk as only a fraction, likely less than 20 per cent, of the coal found on-site is to be removed. On balance, removal remains the preferred option.

Environment Canada will be a Responsible Authority for the environmental assessment of the Landfill Leachate Management and Tar Cell Containment projects. As such, Environment Canada will be addressing the issue of trucking related effects arising from those projects through cumulative effects analyses and through evaluations of alternative means of carrying out the projects. As the volume of trucking associated with these next two projects is far greater than the volume related to this project, and

because those projects are still in the early stages of design, the responsibility for further evaluations of trucking related effects has been shifted to the later projects.

It is concluded that the potential adverse cumulative effects of this project with other projects is not significant, given mitigation.

4.6 Effects Related to Accidents and Malfunctions

Section 2.6 describes the Risk Management Plan, the Master Health and Safety Plan, and the Emergency Response and Preparedness Plan that are all relevant to all environmental clean-up of Muggah Creek watershed projects. Also noted is the requirement for Project-Specific Health and Safety Plans, Environmental Management Plans, and Contingency Plans. Accidents related to trucking on urban roads related to this project will not be at a level where accidents or associated injuries are expected.

The potential adverse effect of an accident or malfunction, such as a spill or traffic accident, on-site could be significant. However, given the level of preparedness for accidents and malfunctions by all partners associated with the project, the potential for these events has been minimized and is not considered significant.

4.7 Conclusion

This project has been assessed in accordance with *Canadian Environmental Assessment Act* requirements. The effects of the project on the environment, the effects of the environment on the project, the cumulative environmental effects of on-site activities and other projects in the area, and the effects related to accidents and malfunctions have been assessed for their potential to produce significant adverse effects. The conclusion reached is that significant adverse environmental effects as a result of this project are not likely, taking into account implementation of the identified mitigation measures.

5.0 MONITORING

5.1 Project-Related Air Monitoring

The proponent, through the PMC, has developed a draft air monitoring plan (AMP) specific to this project. The purpose of the AMP is to allow screening of air quality at the individual activity work sites in real time (Conestoga Rovers & Associates, 2000) and to take timely corrective action should air quality deteriorate to levels of concern. The draft plan was reviewed by Environment Canada and others and is currently being revised.

The AMP includes action levels that are designed to ensure that off-site migration of contaminants is minimized and that air quality in residential areas does not exceed project-specific ambient air criteria. Should exceedances due to project activities occur, the contractor and/or the PMC will evaluate the situation and implement appropriate mitigation measures. These measures will be in addition to the standard dust control measures previously described and may include the use of foam and/or other dust suppressants or temporary shutdowns.

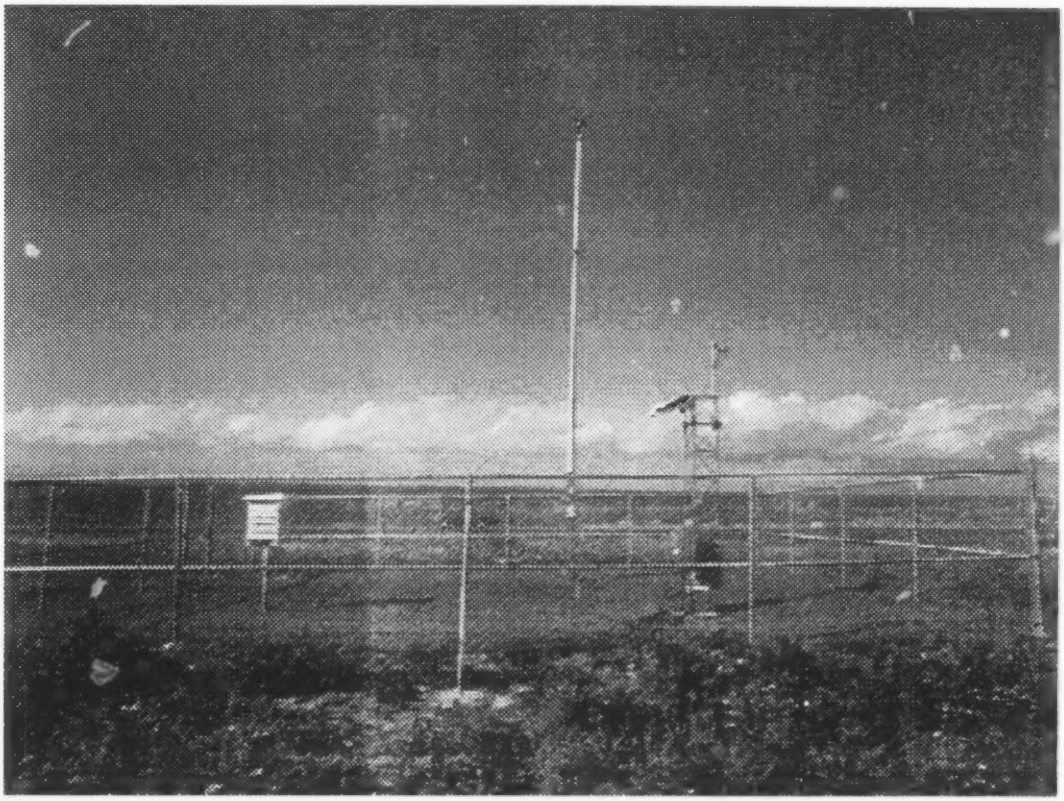
The following air quality parameters will be monitored: VOCs, PAHs, PM_{10}, and selected metals. Field instruments will be used to provide real-time measurements for total hydrocarbons, PM_{10}, and VOCs (benzene, toluene, ethylbenzene, xylene, methylene chloride and napthalene). Real-time monitoring will be conducted upwind, adjacent to, and downwind of the actual work zone and results will be compared to action levels that are based on the project-specific ambient air criteria converted to a one-hour average value. The AMP includes adjustments to ensure the elevated detection limits of some field monitoring equipment do not compromise the effectiveness of the program.

Meteorological conditions will be monitored in real-time on-site under an approval required by NSDOE&L. The weather monitoring station will be established at a fixed location adjacent to the site support facilities and will be similar to the station pictured in Photograph 8. It will have two concrete bases (4 ft by 4 ft by 8 in thick) that would be used to mount the towers. The equipment would be powered by a battery/solar panel and communications would be via a cellular telephone. None of the existing soil would be disturbed with digging footings or trenching power and signal cables. Once the requirement for the station is over, the station will be removed and the concrete bases disposed of at an appropriate location. Subject to confirmation, the station will monitor and log precipitation, wind direction, wind velocity, temperature, and barometric pressure. A portable unit will be used to monitor wind velocity, wind direction, and temperature for specific site activities.

5.2 Ambient Air Quality Monitoring

One of the programs related to the environmental clean-up of the Muggah Creek watershed currently underway relates to ambient air quality monitoring. The program includes stations at the perimeter of the Coke Ovens Site and the parameters monitored are relevant to the COPCs discussed in Section 4. There are links between the program and the project-related air monitoring program discussed in the previous section.

Ambient air quality monitoring has been ongoing since September 1998. Three stationary monitoring stations monitor for PAHs, total suspended particulate (TSP) and metals (one of which also monitors for PM_{10}) every 6 days. Additionally, four stationary locations are monitored for VOCs twice per month. Data collected through 1999 have been analyzed and summarized (AGRA Earth & Environmental Ltd.,



Photograph 8. Example of Weather Station Installation

2000b Draft). Similar reports are expected in subsequent years with the 2000 data expected in March 2001.

Ambient air data will confirm the real-time monitoring results or, if necessary, enhance the interpretation of those results. Revisions to the ambient air quality monitoring program are currently under consideration. Activities related to this project will not commence until the ambient air quality monitoring program is again in effect.

5.3 Water Quality Monitoring

The focus of the water quality monitoring on-site will be on wastewater quality monitoring. Effluent from the wastewater treatment system (see Section 2.4.2) will be monitored on a regular basis for key parameters. A plan for wastewater quality monitoring will be developed by the PMC and approved by NSDOE&L. Environment Canada will provide NSDOE&L its comments on the adequacy of the plan. If a wastewater does not meet the criteria established, it will not be discharged through the municipal sewer system. It will be treated again or taken off-site to an appropriate industrial wastewater treatment facility.

Surface water bodies will be monitored visually for impacts after each significant rainfall event and during activities in the immediate area, as discussed in the EMP. Mitigation measures will be in place to control erosion and sedimentation of streams.

6.0 IMPLEMENTATION OF MITIGATION AND FOLLOW-UP

Environment Canada will require that the proponent, through the PMC, prepare an Environmental Management Plan (EMP). The plan is intended to provide a coordinated approach to implementing the project's required mitigation and follow-up. Responsibilities will be identified and reporting requirements established. A draft of the EMP (Conestoga-Rovers & Associates, 2000a) was used as background in developing this screening report. Conversely, this environmental assessment, when finalized, will be used as input to finalizing the EMP.

A technical specialist, independent of the PMC and on-site contractors, will conduct field-related inspections of activities related to the clean-up of the Muggah Creek watershed. The individual will have responsibilities for ensuring site activities comply with provincial regulatory requirements and will also provide a service to Environment Canada by conducting inspections and reporting on the implementation of mitigation measures. An inspection and report schedule for this project will be established and revised as necessary before work on-site commences.

As part of its overall environmental assessment responsibilities under CEAA, Environment Canada has a program designed to ensure follow-up activities occur on selected projects where the department has assessment and/or regulatory duties. The program will consider the Coke Ovens Site clean-up project as a candidate for evaluation of the effectiveness of its follow-up program. Any deficiencies noted will be corrected.

In addition to the procedures outlined above Environment Canada has other mechanism available to assist in ensuring implementation of mitigation measures. As administrator of federal funds, the department can use the funding mechanism to strongly influence the project's decision-makers. Also Environment Canada will work with the NS Department of Environment & Labour to encourage the incorporation of mitigation measures in provincial regulatory approvals.

Following the completion of the project, the PMC will submit an overall Summary Report which will document the quantity of material removed and disposed from the site and ultimate disposal locations. The Summary Report will also document the condition of the site at the completion of the project and will evaluate the effectiveness of selected mitigation measures and the accuracy of the some of environmental assessment predictions, likely those relating to air quality.

Consistent with the open philosophy of JAG, public participation in the assessment will continue following completion of the screening report. Data generated during site activities will be available to the public through JAG and regular reports will also be made to Environment Canada and the other government parties to the JAG process.

7.0 CONSULTATIONS

7.1 Interim Separation Zones Report

In response to a February 24, 1999 JAG motion, a consultant was contracted *"to develop and evaluate criteria and information necessary to define appropriate separation zones to be established around potential surface clean-up activities and associated areas of work to ensure adequate distance between clean-up activities and adjacent land uses".*

On September 27 1999, an initial public information session on the proposed development of interim separation zones, was hosted by the consultant (AGRA Earth & Environmental Ltd.), and was attended by approximately 100 people. The objective of this meeting was to identify individual concerns and provide a framework for the development of the zones. AGRA Earth & Environmental Ltd. also released two newsletters in 1999: Project Update Number 1 - September 1999 and Project Update Number 2 - December 1999.

On September 14, 2000, AGRA Earth & Environmental Ltd. released the draft *Development of Interim Separation Zones* report (2000a) for a three week public comment period. During this time, three community information sessions and an open house for the general public were held. Public concerns included air quality issues, waste transport and disposal, public health and safety and monitoring. All questions raised by the public were documented and responses prepared. Responses are provided in an appendix to the final version of the AGRA Earth & Environmental Ltd. report.

The final version of the interim separation zones report was used as a major source of background information for the environmental assessment. All consultation comments made on that report were considered.

7.2 Environmental Assessment

Under CEAA, Environment Canada is responsible for ensuring an environmental assessment is completed on this project. Although public consultation is not technically a requirement for environmental assessments at the screening level, Environment Canada determined that public consultation was warranted and a program was undertaken.

In July 2000, a discussion document outlining the project and possible environmental effects was prepared by Environment Canada and distributed primarily to government agencies and JAG members to initialize discussions about regulatory requirements and expected environmental effects with the proponent.

On December 5, 2000, copies of the draft screening report were made available for public review and comment. Display ads were published in the *Halifax Chronicle Herald*, the *Cape Breton Post*, and in the French weekly *Le Courier de la Nouvelle Ecosse*. It was also available on the JAG website *www.muggah.org*. On December 7 and 8, 2000, flyers were hand delivered to approximately 600 homes in Whitney Pier and Ashby. This approach was taken in response to the Public Opinion Poll conducted for JAG (Marketing Research Centre, 2000) that found that residents felt that the newspaper and newsletters delivered to their residence were the best methods of obtaining reliable information. The objective of the flyer was to raise awareness to the proposed project, the CEAA assessment process, and the upcoming consultation sessions.

Public consultation sessions were held in Sydney from December 11-14, 2000. These sessions included:

- a presentation to the Environmental Data Gathering and Remedial Options (EDGAR) working group of JAG;
- a technical media briefing;

- a community meeting/open house in both the Whitney Pier and Ashby areas of Sydney (communities neighbouring the site);
- a meeting with representatives from Rescue our Community, a local community group; and
- an open house for all interested individuals.

Representatives from Environment Canada, Health Canada, the PMC, NSDOE&L, NSTPW, and JAG were on hand to explain the project and respond to questions. Offers were extended to meet with representatives of other groups, including Membertou First Nation, during this period, however, none of the groups accepted the offer to meet.

All comments received during the course of the public consultation period (December 6, 2000 to January 15, 2001) were reviewed and considered prior to development of this screening report (see Appendix 2).

In addition to the public, the draft screening report was circulated within Environment Canada and to the following government agencies:

Federal Government
- Health Canada
- Fisheries and Oceans Canada
- Natural Resources Canada

Provincial Government
- Nova Scotia Department of Transportation & Public Works
- Nova Scotia Department of Environment and Labour
- Nova Scotia Department of Health
- Nova Scotia Museum

Municipal Government
- Cape Breton Regional Municipality

First Nations
- Membertou First Nation

Others
- Joint Action Group
- Cape Breton Development Corporation
- Canadian National Railway

8.0 ENVIRONMENTAL ASSESSMENT DECISION

Based on the information gathered to date, and the results of the screening, Environment Canada (the Responsible Authority) has concluded, in accordance with Section 20 of the *Canadian Environmental Assessment Act*, that **significant adverse environmental effects are not likely, taking into account**

implementation of the identified mitigation measures, and that public concerns do not warrant referral of the project to a mediator or a review panel.

Prepared by: Environment Canada

Approved by:

Diane Giffin-Boudreau
Director, Sydney Tar Ponds / Coke Ovens Clean-Up Project
Environment Canada

Date: March 30, 2001

Environment Canada will work with JAG, Health Canada, the Province of Nova Scotia and Cape Breton Regional Municipality to ensure that follow-up requirements and mitigation measures are implemented as described in the screening report. Where appropriate, the effectiveness of these requirements and measures will be evaluated.

This screening report is available to the public. To view or obtain a copy, contact:

Environment Canada
320 Esplanade Road
Sydney, NS B1P 7B9
Tel: (902) 564-2782
Fax: (902) 564-2782
Email: Wayne.Pierce2@ec.gc.ca

Environment Canada
45 Alderney Drive, 11th floor
Dartmouth, NS B2Y 2N6
Tel: (902) 426-4992
Fax: (902) 426-3654
Email: Adrian.MacDonald@ec.gc.ca

The report will be made available on the Joint Action Group website: *www.muggah.org*

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GLOSSARY

AGRA	AGRA Earth and Environmental Ltd. Currently AMEC Earth and Environmental Ltd.
BTEX	benzene, toluene, ethylbenzene, xylene. BTEX are monocyclic aromatic hydrocarbons.
CEAA	*Canadian Environmental Assessment Act*

CBRM	Cape Breton Regional Municipality, which includes the former City of Sydney.
CBDC	Cape Breton Development Corporation
CCME	Canadian Council of Ministers of the Environment. A Canadian advisory group that develops environmental guidelines.
COCP	Chemicals of potential concern selected for review from all chemicals found during the site investigations.
Coke	Solid carboniferous residue obtained from bituminous coal following the removal of volatile material. Coke is used as a fuel source and for making steel.
Coke Breeze	Coke dust that results from the burning of coke.
Contaminant	is a concentration of any physical, chemical, biological or radioactive substance in air, soil or water above natural background levels.
Domtar	Dominion Tar and Chemical Company Ltd.
Dangerous Goods	A product, substance or organism included by its nature or by the regulations in any of the classes listed in the schedule to the *Transportation of Dangerous Goods Act*.
ERAPP	Emergency Response and Preparedness Plan. Details the measures to be taken during a hazardous occurrence. A hazardous occurrence is defined as any event that has the potential to result in or has resulted in a fatality, injury, property damage or the release of hazardous materials.
Friable	Dry material that crumbles, pulverizes or reduced to a powder by hand pressure.
Guideline	A numerical concentration or narrative statement that is recommended as an upper limit to protect and maintain a specified use of air, water, sediment, soil or wildlife. Guidelines are not legally binding.
JAG	Joint Action Group for the Environmental Clean-up of the Muggah Creek Watershed. A community based group that works with the Government of Canada, the Province of Nova Scotia and the Cape Breton Regional Municipality to seek solution to the environmental and health risks arising from contamination in the Muggah Creek Watershed.
Hazardous Waste	Term normally used interchangeably with waste dangerous goods, as defined by the *Transportation of Dangerous Goods Act*.
Interim Separation zones	Temporary areas identified to ensure adequate separation between the potential surface clean-up activities and adjacent land uses.

NSTPW	Nova Scotia Department of Transportation & Public Works
MAID Site	Municipal Ash and Industrial Disposal site
MHASP	Master Health and Safety Plan for the Environmental Clean-up of the Muggah Creek Watershed. Provides guidelines, requirements and procedures intended to protect the health and safety of the public and any person who enters a work site.
MOU	Memorandum of Understanding for the Environmental Clean-up of the Muggah Creek Watershed.
NSDOE&L	Nova Scotia Department of Environment & Labour
PAHs	Polycyclic aromatic hydrocarbons. PAHs are formed by the incomplete burning of organic materials, both natural and anthropogenic
PCBs	Polychlorinated biphenyls
PMC	Project Management Consultant. Conestoga-Rovers and Associates is the consulting firm retained as the PMC. The role of the PMC involves preparation and administration of tender packages as well as oversight of work on the Coke Ovens Site.
PM_{10}	Particulate matter less than 10 microns (µm) in diameter
Responsible Authority	A federal government department with a responsibility to conduct and environmental assessment under the *Canadian Environmental Assessment Act.*
Remediate	The improvement of a contaminated site to prevent, minimize, or mitigate damage to human health or the environment. Remediation involves the development and application of a planned approach that removes, destroys, contains, or otherwise reduces availability of contaminants to receptors of concern.
SYSCO	Sydney Steel Corporation
TSP	Total Suspended Particulates
Transite Siding	Asbestos-containing siding
VOCs	Volatile organic compounds. VOCs easily mix with the air.
Waste Dangerous Goods	Any product, substance or organism that is dangerous goods that is no longer used for its original purposes as defined by the *Transportation of Dangerous Goods Act and Regulations.*

APPENDIX 1: REGULATORY FRAMEWORK

Aspects of the project are regulated by federal and provincial legislation, regulations, policies and guidelines. These requirements include, but may not be limited to, those described in the following sections. With the exception of CEAA related obligations, the proponent, its consultants, or its contractors will be responsible for obtaining all required approvals, authorizations and/or permits.

Federal Requirements

***Canadian Environmental Assessment Act* (CEAA)**

The purposes of the Act are:

- To ensure that the environmental and health effects of projects receive careful consideration before responsible authorities take actions;
- To encourage responsible authorities to take actions that promote sustainable development and to thereby achieve or maintain a healthy environment and a healthy economy;
- To ensure that responsible authorities carry out their responsibilities in a coordinated manner with a view to eliminating unnecessary duplication in the environmental assessment process;
- To ensure that projects that are to be carried out in Canada or on federal lands do not cause significant adverse environmental effects outside the jurisdictions in which the projects are carried out; and
- To ensure that there be an opportunity for public participation in the environmental assessment process.

This project triggers an environmental assessment in accordance with Section 5(1)(b) whereby the federal government has been requested to provide financial assistance to the proponent for the purpose of enabling the project. Under Section 16, every screening of a project shall include consideration of the following factors:

- the environmental effects of the project, including the environmental effects of malfunctions or accidents that may occur in connection with the project and any cumulative environmental effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out;
- the significance of the effects;
- comments from the public that are received in accordance with the Act and the regulations;
- measure that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the project; and
- any other matter relevant to the screening such as the need for the project and alternatives to the project.

Canadian Environmental Protection Act

The new *Canadian Environmental Protection Act* is designed to protect the environment and human health through pollution prevention. It also provides the framework for protecting Canadians from pollution caused by toxic substances. Health Canada has the responsibility for assessing and managing risks to human health posed by environmental substances.

Fisheries Act

The *Fisheries Act* addresses all activities that may harm fish, and/or alter, disrupt or destroy fish habitat. Project-related activities (e.g. fording watercourses, spillage, siltation), could potentially impact watercourses that transverse the site. Sections of the Act that may be relevant to the project include:

Section 35: Pertaining to harmful alteration, disruption and destruction of fish habitat. Administration and Enforcement Agency – Fisheries and Oceans Canada.

Section 36: Pertaining to the introduction of deleterious substances Administration and Enforcement Agency – Environment Canada.

Policy for the Management of Fish Habitat

The Policy for the Management of Fish Habitat is the Department of Fisheries and Oceans long-term policy objective for the achievement of an overall net gain of the productive capacity of fish habitats.

Transportation of Dangerous Goods Act

The federal *Transportation of Dangerous Goods Act* and regulations govern the handling, offering for transport, and transportation of dangerous goods. Each province and territory has adopted the federal

regulations made under the federal statute as part of it's own provincial legislation. The federal Act contains requirements for the classification and packaging of 'dangerous goods' as defined by the Act. The legislation specifies methods to determine if materials are subject to the requirements of the Act. In general, transportation of dangerous goods within a province is regulated by Provincial legislation.

Migratory Birds Convention Act

The *Migratory Birds Convention Act* and its regulations (*Migratory Bird Regulations, Migratory Bird Sanctuary Regulations*) contain provisions to protect migratory birds, nests and eggs. Section 6 of the *Migratory Birds Regulations* states that no person shall disturb, destroy or take a nest, egg, nest shelter, eider duck shelter or duck box of a migratory bird except under authority of a permit. Section 35 of the *Regulations* prohibits the deposition of oil, oil wastes or other substances harmful to migratory birds in any waters or any area frequented by migratory birds.

The level of activity and the lack of appropriate habitat will deter most migratory birds from using the site. The derelict structures may provide nesting locations for some species and scare tactics will be used in early spring if necessary.

Federal Policy on Wetland Conservation (1991)

To promote the conservation of Canada's wetlands to sustain their ecological and socio-economic functions, now and in the future. The federal government will develop exemplary practices in support of wetland conservation and sustainable wetland use to be incorporated in the design and implementation of federal programs and in the management of federal lands and waters.

Canadian Biodiversity Strategy - Canada's Response to the Convention on Biological Diversity (1995)

The Strategy provides a framework for action at all levels that will enhance our ability to ensure the productivity, diversity and integrity of our natural systems and, as a result, our ability as a nation to develop sustainably. It promotes the conservation of biodiversity and the sustainable use of our biological resources, and describes how we will contribute to international efforts to implement the Convention.

Provincial Requirements

Environment Act

The *Environment Act* and its regulations and guidelines are administered by the Nova Scotia Department of Environment and Labour to support and promote the protection, enhancement and prudent use of the environment for a wide range of activities. The following Regulations and guidelines may be applicable to this project.

Activities Designation Regulation

An approval for the project will be required under the *Activities Designation Regulation*, Division V - Industrial Approvals, Part I - Chemical; Section 12 (g):

> The construction, operation or **reclamation** of a coke or carbon manufacturing plant in which coke or carbon products are produced or processed.

The approval regulates all aspects of the project having potential adverse environmental effects. It will be issued to the Nova Scotia Department of Transportation & Public Works.

Dangerous Goods Management Regulations

The *Dangerous Goods Management Regulations* control and monitor the handling and storage of materials considered to be a potential threat to the environment. These regulations will apply to certain

project activities such as fuel storage and handling of any debris or residual material deemed a waste dangerous good. Approval is required for storage of disposal of dangerous goods or waste dangerous goods.

Air Quality Regulations
The *Air Quality Regulations* set criteria for ambient air quality throughout Nova Scotia, expressed as maximum permissible ground level concentrations. An approval is required to ensure that the concentrations prescribed are not exceeded. Total Suspended Particulate (TSP) is the only contaminant listed that is of concern with respect to this project.

Asbestos Waste Management Regulations
This regulation defines "asbestos waste" as friable waste material containing asbestos fibre or asbestos dust in a concentration greater than 1 percent by weight. "Friable" waste material is defined as a material that when dry can be crumbled, pulverized or reduced to powder by hand pressure. The Regulation designates asbestos waste as a waste dangerous good, and specifies requirements for removal, packaging, shipping, transport and disposal of asbestos waste.

Guidelines for Disposal of Contaminated Solids in Landfills (1994)
According to these Guidelines, contaminated solids may be disposed of in sanitary landfills provided they do not exceed stated criteria. Solids contaminated with petroleum hydrocarbons must be handled in accordance with the Guidelines for the Disposal of Oily Soil (1990). Soil containing hydrocarbons is acceptable for disposal at approved landfills provided that the hydrocarbons are fully sorbed to the soil (i.e. no free product). Solids that exceed the stated criteria are considered hazardous waste and can only be disposed of in a designated hazardous waste secure landfill.

Noise Guidelines
The Department of the Environment Pit and Quarry Guidelines include sound level limits to be observed at the property boundaries of the pit and quarry. These are included in the approval issued under the Activities Designation Regulations, Division V - Industrial Approvals, Part 2 - Construction, for pits and quarries. These sound level limits have, in the past, been placed on industrial projects other than pits and quarries. As this project is of a short-term nature the sound level limits are not entirely appropriate. The designation of daytime working hours, 07:00 to 19:00 hours, has been adopted for this project.

Erosion and Sediment Control - Handbook for Construction Sites
The Handbook details design and construction methods for various erosion and siltation control measures.

Dangerous Goods Transportation Act
This Act regulates the intra-provincial movement of dangerous goods, and complements the federal *Transportation of Dangerous Goods Act* in Nova Scotia.

Occupational Health and Safety Act
The *Nova Scotia Occupational Health and Safety Act* and Regulations regulate practices in the workplace that may affect worker health and safety. It is administered by the Nova Scotia Department of Labour.

Municipal Requirements

Sewer Discharge Bylaw
A bylaw respecting the regulation of discharges to the municipal sewer system.

APPENDIX 2: RESPONSE TO CONCERNS REGARDING THE DRAFT SCREENING REPORT AND DURING CONSULTATION SESSIONS

Appendix 2 summarizes the most important comments and questions provided by the public and government on the draft screening report and during the public consultation sessions. The many comments and questions relating to minor editorial changes or support for the report's finding are not included.

Public Comments:

Particulate matter with a diameter of less than 2.5 micrometres ($PM_{2.5}$) is a greater hazard to health than particulate matter with a diameter of less than 10 micrometres. $PM_{2.5}$ should be monitored.

In many situations, $PM_{2.5}$ is in fact a more serious health concern than PM_{10}. Nevertheless, there are health risks, especially those that manifest themselves in the upper respiratory tract, that may be attributed to the coarser fraction of PM_{10}. These coarser particles are generated by various activities including demolition and truck traffic. Consequently PM_{10} is the appropriate fraction for air quality monitoring in relation to this project.

This comment led to further consideration of an appropriate air quality criterion for use in the follow-up monitoring required of this project. A Federal-Provincial Advisory Committee adopted a PM_{10} *reference level* of 25 $\mu g/m^3$ and CCME 1999 provides an air quality criterion for PM_{10} of 25 $\mu g/m^3$. Although identified by CCME in its summary table as an air quality guideline, the text of the report describes the 25 $\mu g/m^3$ as a *reference level*. (A *reference level* is defined as a level above which there are demonstrated effects on human health and the environment. It is not an air quality objective or standard but does provide a basis for establishing goals for air quality management.)

AGRA Earth & Environmental Ltd. (2000a) proposed 25 $\mu g/m^3$ as the exposure limit for the development of interim separation zones and included this value in its modeling. Although use of a reference level in this manner is not recommended, the outcomes of the modeling remain valid for the purposes of environmental assessment as the reference level is the most conservative estimate of the level at which human health or environmental effects are anticipated. Its use errs on the side of over-estimating the risk of adverse health effects.

Consistent with the general approach of erring on the side of caution, the real-time air monitoring program will use the 25 μ/m^3 value to define the maximum 24 hour exposure limit and to derive project-specific action levels. Exceeding action levels will signal the requirement for corrective measures to reduce the air-borne release of particulate matter. However, monitoring data will be interpreted based on the knowledge that PM_{10} at 25 $\mu g/m^3$ is a reference value not an air quality guideline.

The overlying layer of wastewater in the Domtar tank containing 1.2 mg/L PCBs has been diluted from years of rain accumulation and should be considered as a hazardous waste.

Environment Canada has re-evaluated the issue of PCBs in the Domtar Tank water and has concluded that the laboratory result quoted above is unreliable for the following reasons: PCBs are relatively insoluble in water and would be found at a concentration of 1.2 mg/L only if adhering to re-suspended solids;
recent sampling has confirmed that PCBs are not present in the solids underlying the water; and the second sample of water collected and tested as part of the materials sampling program had a PCB concentration of less than the laboratory detection limit.

Recognizing that there remains some uncertainty as to the presence of PCBs, both the influent and effluent of the wastewater treatment plant will periodically be analyzed for total PCBs. The treatment system is designed to remove organics such as PCBs. The discharge criteria currently under consideration is 0.1 µg/L. Environment Canada will be recommending to NSDE&L that this limit be included in the regulatory approval required for this project.

Diluting contaminants through the activity of washing to an "acceptable standard" does not make dumping of such material acceptable or correct to the community or to the marine environment. The washwater from the Domtar Tank, the Benzol Tank, the Benzol Area Tank, the By-Products Building, and the groundwater removed from the No. 6 coke oven battery and the Sulphur Building should all be handled as hazardous waste.

It is anticipated that the tank cleaning wastewater will be much more heavily contaminated with residual materials from the tanks and from cleaning solutions than will be the standing water that is currently present in the tanks, so dilution is not occurring. The cleaning water will be analyzed to determine and confirm that the water can be treated at the on-site treatment facility. All standing water and cleaning wastewater at the Site will be treated to remove the contaminants prior to discharge to the municipal sewer system. This process removes contaminants, not dilutes them. The treated wastewater will be tested to confirm that treatment standards have been met. Washing of tanks and equipment prevents the uncontrolled migration of contaminants adhering to solid materials that are leaving the site and allows for concentration and appropriate disposal of the contaminants.

How and where the contents of the Domtar tank will be disposed should be made public immediately.

The selection of disposal facility will be based largely on competitive bid. As contracts will not be awarded until after the environmental assessment screening report has been concluded, no facilities have been selected at this time. The proponent will notify Environment Canada of the selected disposal facility when it is known.

The Benzol Area Tank and Benzol Tank should be emptied in a similar manner as the Domtar Tank i.e. within an airtight enclosure with a ventilation system.

Unlike the Domtar Tank both the Benzol Area Tank and the Benzol Tank are closed top tanks that are readily sealed. The extra caution proposed for the Domtar Tank is due to its open top and the much larger volume of waste involved.

The cooling tower grid debris would be more safely removed if done so in a similar manner as the Domtar tank.

The anticipated volume of waste to be removed from the cooling tower grid debris pile is relatively small, and will be performed in a single day. Modeling results indicate the material can be removed safely in the manner proposed with a significant distance between the necessary separation zone and the perimeter of the Site. The debris removal activity will be closely monitored for emissions. The disturbed area will be covered with a clean soil layer as soon as practicable after removal of the debris.

Removal of the coal and coke piles should occur within an enclosed air tight facility.

The approach for the Coal and Coke Piles is consistent with the Site Separation Zone Report. The disturbed area will be covered with a clean soil layer as soon as practicable after removal of the coal or coke. The coal and coke removal activity, as will all activities, will be closely monitored for emissions. In accordance with the air monitoring plan, should levels of emissions approach the acceptable standard for those emissions at the Site, then the removal activity will be modified such that emissions do not exceed the acceptable standards. The air quality parameter of greatest concern with the removal of coal and coke is PM_{10} and much of it relates to on-site trucking. Fabrication of an air tight facility would not address this source.

Consideration should be given to installing an air-vacuum collection system while the lining bricks of the battery stacks are being dislodged within the chute. The remaining shell should be considered hazardous waste when being demolished, transported, and disposed. All rubble from these stacks should be considered hazardous.

The removal of bricks within the stacks will be a wet activity, with minimal dust generation expected. Should levels of emissions approach the acceptable standard, the removal activity will be modified. As the stack will be mostly sealed prior to initiating brick removal, a possible modification is to install a vacuum fan at the base. Materials are designated as hazardous waste in accordance with requirements of both federal and provincial regulations. The requirements do not apply to the stack materials.

Demolition and excavation of the No. 6 coke oven battery should occur within an air-tight facility.

The approach for the coke oven battery is consistent with the site separation zone report. Prior to actual demolition of the remains of the structure, surfaces will be pre-cleaned to remove dust and other residuals. Demolition of the remainder of the No. 6 oven battery will be closely monitored for emissions.

Soil underlying the sulphur stockpile should be left undisturbed and covered, similar to coal piles.

A revision to the project description in Section 2.3.4 was made in response to this concern. The recommended procedures have been adopted.

Which "appropriate solid waste disposal facility" would be used (if a purchaser cannot be found for the sulphur) should be specified well in advance of any sulphur removal.

This concern is addressed in Section 2.5.

The By-products Building and Sulphur Building should be demolished piece by piece, similar to the battery stacks.

The planned demolition method is to dismantle the structure in small sections utilizing mechanical shears. This dismantling will occur after the structure has been cleaned, and the asbestos waste materials have been removed. The dismantling will be closely monitored for emissions.

Emphasis should be put on the need for construction of a new access road for the safe removal of materials from the site and minimizing contact with residential areas.

The issues surrounding trucking are addressed in the screening. Construction of a new access road, as well as decontamination and inspection of trucks before leaving the site, minimizes the impact of trucking on local residents.

Sanctions should be taken against contractors who do not comply with project requirements.

Contractors activities will be monitored by the PMC. If requirements are not being met, contractors will be directed to correct the problem. For serious failures to follow required procedures, contractors will be required to leave the site. Environment Canada has taken special measures to ensure commitments for this project are put in place by arranging for a technical specialist, independent of the PMC and on-site contractors, to conduct site inspections.

Why weren't the cumulative effects of contaminated materials falling off of trucks onto municipal roadways considered?

The decontamination pad located at the exit of the site will clean all trucks that may carry contaminated materials onto municipal roadways. This waste will be treated on-site. All trucks will be covered, cleaned and inspected before leaving the site. The project was modified to address the issue of contaminated material falling off trucks by including an access road directly to the MAID site.

What will be the effects of the project on the MAID site?

Only materials meeting the provincial solid waste guidelines will be deposited at the MAID site. Some of these materials may be used as shaping material for the landfill closure project.

Could inappropriate activities up-gradient of the coke ovens site, at the landfill or borrow site, have a negative impact on the coke ovens site?

The environmental assessment of the landfill closure project is being coordinated by Environment Canada in a manner similar to the coke ovens screening. The landfill closure will be designed and implemented so that no significant impacts occur on down-gradient areas.

What is the possibility that children or sensitive individuals walking from the community of Whitney Pier will be exposed to risks as they walk past the coke ovens site?

The Cape Breton - Victoria Regional School Board has confirmed that there are no students walking across the Victoria Road overpass, past the coke ovens site, to school. All students are bused to school. The AGRA interim separation zones report assumed exposures of all ages with varying sensitivities, including children and the elderly.

Will air monitoring be conducted 24 hours a day, 7 days a week?

Some air quality monitoring may be initially conducted 24 hours per day, 7 days per week. In particular, during the initial stages of emptying the Domtar Tank, around the clock air quality monitoring may be done. The initial results will be evaluated, and if appropriate, air monitoring will be scaled back. Normally, project-specific air monitoring will be conducted only while specific on-site activities are in progress. Results of all air quality monitoring will be available to the public through JAG.

What if someone gets sick – is there somewhere for them to go to determine if the project made them sick?

No, there will be no special facility for that purpose. The project has been designed with numerous conservative assumptions incorporated to prevent off-site impacts. Corrective measures will be implemented should real-time monitoring results indicate that unacceptable levels of contaminants are occurring in locations approaching residential areas.

Laid-off steelworkers were promised the right to first refusal to work with the tar ponds clean-up projects and they should receive a fair share of this work. Governments should take this into consideration when assigning contract work.

The demolition contracts will be tendered through and administered by the PMC. Due to the nature of the work, many of the contracts will be of interest to local contractors.

Will the public be guaranteed notification of activities at the site?

Yes. A system of flags will also be used on-site to make workers aware of the level of air monitoring being conducted. The results of routine and enhanced air monitoring results will be collated and assembled into a report that will be distributed to the PMC daily, for the previous day's air monitoring. The PMC will keep JAG informed of project activities.

Due to the history of failed attempts of cleaning up the overall Site, and due to notorious inadequacy of testing in the past, widespread lack of trust and faith by the community in the proponent is real, persistent, and reasonable. To ensure the accuracy and competency of carrying out the project tasks, and to greatly increase the degree of acceptance by the community as the project is carried out, funding should be made available for independent monitoring of activities and testing of materials, on a continuous basis while the Project is being carried out.

The PMC will be conducting monitoring of activities and testing of materials independent of the contractors completing the work. JAG will be kept informed of activities and results and will be expected to continue to participate in the decision-making process as the project is implemented. Environment Canada is obligated to ensure follow-up requirements for the project are met. Funding has been acquired to assist Environment Canada in meeting this obligation. This level of oversight is considered sufficient.

Why was a screening assessment done, rather than a full panel review?

A screening is a systematic approach to documenting the environmental effects of a proposed project and determining the need to eliminate or minimize (mitigate) these effects; to modify the project plan; or to recommend further assessment through mediation or a panel review. It is the most flexible type of assessment, accommodating both simple, routine projects as well as larger projects. Screenings vary in time, length, and depth of analysis, depending on the circumstances of the proposed project, the existing environment, and the likely environmental effects. Some screenings may require only a brief review of the available information; others (like this one) may need new background studies and be as thorough and rigorous as higher level environmental assessments.

The responsible authority must not take any action that enables the project to proceed, if the project is likely to cause significant adverse environmental effects (taking into account any appropriate mitigation measures). Alternatively, if the screening has identified the need for further review, the responsible authority must ask the Minister of the Environment to refer the project to mediation or a panel review. Further review is necessary when:

- it is uncertain whether the project is likely to cause significant adverse environmental effects; or
- the project is likely to cause significant adverse environmental effects and it is uncertain whether these effects are justified in the circumstances; or
- public concern warrants it.

In this case, Environment Canada, as the responsible authority, did not feel that referral of this screening to mediation or a panel review was appropriate.

Why were VECs (valued ecosystem components) not identified in the screening report?

In a manner similar to the identification of VECs, the screening focused on the key issues associated with the project.

Government

CWS: *When discussing human exposure pathways, the possibility of ingestion of chemicals by ingesting homegrown garden produce exposed to chemicals is investigated; however, there is no mention of the possibility of these chemicals being passed on to humans consuming game animals (deer, snowshoe hare, ducks). Is there a possibility that game animals consumed by humans could bioaccumulate toxic substances released during project activities?*

The AGRA site separation zone report concluded that air-borne and inhalation was the primary route of exposure. This conclusion was accepted by the health risk specialists who reviewed the AGRA report. Although game animals have been observed on the site, its urban location and its degraded condition preclude extensive use by such animals.

CWS: *Is there a possibility that predators (such as birds of prey) could be negatively impacted if their prey species bioaccumulate toxic substances released during project activities?*

The potential effects of this project are insignificant in relation to the larger environment that birds of prey occupy.

CWS: *It is indicated that scare tactics will be used in the spring if necessary to deter birds from nesting on derelict structures to be demolished. The Canadian Wildlife Service should be consulted regarding scare tactics proposed.*

A representative from the Canadian Wildlife Service recently inspected the site and has provided recommendations on necessary measures.

CWS: *In the Sydney Coke Ovens and Tar Ponds botanical inventories, it is indicated that two unique snails and two rare mosses are found in the area. What would be the impact of the proposed project, if any, on these species? If impacts are expected and likely, what mitigation measures would be put in place?*

The Atlantic Canada Conservation Data Centre has advised that there are no records of faunal species at risk at this site. Haber (2000) concluded that there are no rare floral species at risk. The uniqueness of certain species on the site reflect their lack of study, not rarity. Also, the area of the coke ovens site actually disturbed as a result of this project will be relatively small and is insignificant in comparison to past activities.

NS Health: *Emergency response planning in the event of a motor vehicle accident both with and without dangerous goods on board should be addressed.*

An emergency response vehicle specifically designed to handle materials at this site has been delivered. The emergency response team will be undergoing training, before the start of the project, in management of incidents. This will include traffic accidents.

Department of Fisheries and Oceans*: The project is not expected to result in harmful alteration, disruption, or destruction of fish habitat provided that in the spring of 2001 additional information on physical and biological conditions in Cagney Brook be collected; this information be taken into account in relation to project activities; and that Cagney Brook be monitored until the required information is collected.*

The information on fish and fish habitat requested by Fisheries and Oceans will be collected following the arrival of warmer weather. It will be evaluated in relation to the project and a response provided to Fisheries and Oceans.

NS Department of Environment & Labour: *An initial screen of waste materials relative to the Dangerous Goods Management (and TDG) regulations is recommended. Discussion with the department will be required on discharge limits proposed for the onsite water treatment system and more detail is required on the water treatment system, decontamination pad, proposed Domtar Tank enclosure system, and surface water quality monitoring.*

The detail required will be provided by the proponent as part of NSDOE&L regulatory approval process.